Kispiox Resource Management Plan

Socio-Economic Impact Assessment

FINAL REPORT

Submitted to
Economics and Trade Branch
Ministry of Forests

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TABLE I
REGIONAL ACCOUNTS
Evaluation Summary[a]

ACCOUNT	OPTIONS			
	A & B	C	Consensus	D
Regional Economic Development[b]				
Employment Losses (PYs/yr)	100-173	184-249	223-263	223-276
Income Losses ($ million/yr)	4.3-7.3	8.0-10.6	9.5-11.3	10.0-12.5
Environmental Values				
Recreation & Wilderness Activity (annual growth rate in value[c])	-	1%	1%	2%
Community Characteristics / Quality of Life				
Population (Impact Rating)	Lowest	Moderate to High	Highest	Highest
Social Services (Impact Rating)	Lowest	Moderate to High	Highest	Highest
Social Integration (Impact Rating)	Moderate	Lowest	Lowest	Highest
Local Government Revenues (Risk of Mill Closure)	Lowest	Moderate	Moderate	Highest
Specific Native Community Concerns				
Native Subsistence Use (Harvest Level)	Decrease	Slight Decrease	Slight Decrease	Same as Now

(a) Range represents range of annual impacts associated with the two AAC scenarios under each option (i.e. falldown to LRSY after 100 and 150 years)
(b) Includes direct and indirect impacts associated with changes in timber harvesting processing and tourism activity
(c) Total willingness-to-pay value of wilderness and recreational activities

TABLE II
PROVINCIAL ACCOUNTS
Evaluation Summary[a]

ACCOUNT	OPTIONS			
	A & B	C	Consensus	D
Provincial Economic Development[b]				
Employment Losses (PYs/yr)	146-250	266-358	320-378	316-392
Income Losses ($ million/yr)	5.6-9.6	10.4-13.9	12.5-14.7	12.8-15.8
Environmental Values				
Provincially Significant Environmental Values (Impact Rating)[c]	Highest	Lower	Lowest	Lowest
Provincial Government Finances				
Net Revenue Losses ($ millions/yr)[d]	1.2-1.9	2.3-3.0	2.7-3.0	3.2-3.7
Economic Efficiency of Resource Use				
Net Resource Value Losses[e] ($million NPV)	7.7-12.6	9.6-13.8	12.0-14.4	8.4-11.8

(a) Range represents range of impacts associated with the two AAC scenarios under each option (i.e., falldown to LRSY after 100 and 150 years)
(b) Includes direct and indirect impacts associated with changes in timber harvesting/processing and tourism activity. Includes regional impacts.
(c) Refers primarily to angling and grizzly bear viewing on the Babine River and wilderness/scenery values in the Seven Sisters/Swan Lake area.
(d) Estimated base stumpage plus corporate income and logging tax losses less incremental MOF costs. Excludes impacts on tourism and recreation and related taxes and fees.
(e) Estimated as indicated stumpage plus bonus bids less incremental MOF costs less "willingness-to-pay" value of recreation and wilderness gains. Estimates here are based on a discount rate of 8% and annual growth rates in recreational/wilderness values of zero for A and B, 1% for C and Consensus and 2% for Option D.

With Respect to Guidelines

The multiple accounts framework can provide a systematic and consistent set of guidelines with which to assess the regional and provincial implications of MOF management plan alternatives. The application of these guidelines to the Kispiox has raised a number of problems or issues, although these problems are likely to be encountered in any formal socio-economic exercise.

1. *Uncertainties regarding the appropriate specification of the Base Case and the transition strategy for the various options.* For example, depending on the definition of the Base Case (e.g., regarding trends in forestry employment)

and the way in which AAC reductions are phased in, it is possible in most of the options to virtually eliminate community impacts and short term employment impacts. The usual means of dealing with these problems is to assess the implications of different assumptions and policy options. Full application of the guidelines for a large array of options and assumptions can become a very costly and cumbersome exercise. Also, the evaluation and comparison of impacts would be more consistent if the same sustainability criteria were applied to the Base Case and all management options.

2. *Data limitations regarding the economic significance of management plan impacts on non-timber resource values.* The lack of quantifiable values for these resources results in a perceived bias in the evaluation favouring timber values. This is a problem with any type of formal economic analysis. In fact, since impacts on non-timber resources are analyzed on a stand-alone basis the multiple accounts approach represents an improvement in evaluation methodology. Nonetheless, better baseline data on recreation and wilderness uses and values and the linkage between these values and changes in land management is essential for the forestry planning evaluation process. The documentation of Native values is a crucial component of this baseline research. Better data on wood supply sources and minimum throughput requirements (or "thresholds") for local processing facilities as well as employment factors for alternative harvesting methods are also required to refine the analysis of direct forestry sector impacts of management plan changes.

3. *The role of the multiple accounts approach in the planning and public review process.* Ideally, the evaluation framework should be integrated efficiently with this process to assist in the collection of data and in the formulation and assessment of options, and ultimately contribute to the development of consensus. The guidelines should be used initially as a reference framework to ensure the collection of baseline data consistent with the requirements of the guidelines and to avoid redundant and intrusive rounds of consultations. Baseline data and summary indicators (e.g., job and income impact coefficients) could then be used to assist in the development of sustainability criteria and a range of land management options. Formal application of the guidelines could then be undertaken on a more limited number of options.

1.0 Introduction

The Kispiox Timber Supply Area (TSA) has been the subject of an extensive planning process. Beginning in 1989, about 40 resource user groups in the area were solicited by the local Ministry of Forestry staff for their input on management of the TSA's resources. Preliminary land use options were then developed by the Ministry of Forests and user group workshops were convened to review these options. Further refinement and technical analysis of the four options ensued. An initial resource and economic impact assessment and the options report were reviewed at a series of user group workshops in the fall of 1991. These meetings resulted in the development of a fifth consensus land management option.

The economic impact assessments of the Kispiox TSA options completed to date have been limited in terms of scope and effort. Assessments have focused on individual resources, such as forests or tourism, and a limited number of economic indicators, such as employment and government revenue.[1] This information provides some insight into the implications of various options. However, there is a need to provide a more comprehensive and in-depth analysis of the impacts of the five options on people, their communities and their economy. That is one purpose of this study. The second purpose is to test the application of a new set of socio-economic impact assessment guidelines[2], developed for the province's forest land management planning process.

The components of these guidelines and the framework of analysis are discussed in Chapter 2. Chapter 3 describes the base case in the study area in terms of current economic activity. A brief description of the forest land management options is provided in Chapter 4. Chapter 5 assesses the impacts of the options and Chapter 6 summarizes these impacts.

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1 See, for example, Marvin Shaffer & Associates Ltd., *Economic Impacts of Alternative Forest Management Plans in the Kispiox Timber Supply Area*, prepared for the Ministry of Forests, September, 1991.

2 Marvin Shaffer & Associates Ltd., *Guidelines for Social and Economic Impact Assessment of Forest Land Management Options*, 1992.

2.0 Socio-Economic Impact Assessment Framework

The approach used to assess socio-economic impacts in this report is based on a multiple accounts framework. Multiple accounts analysis recognizes that there are a number of dimensions to socio-economic impacts that cannot be summarized in a single indicator or measure. It involves an established set of evaluation accounts which are used to document the range of impacts in a systematic and consistent way. Multiple accounts analysis cannot indicate which option is clearly preferred; rather, it identifies the implications of the options for each evaluation criterion or account, and the key trade-offs between options.

Both regional and provincial evaluation accounts are used. Regional accounts indicate the social, environmental, and economic impacts of the options on communities within the planning region. Provincial accounts document impacts on communities outside the planning region and in the province as a whole.

2.1 Regional Evaluation Accounts

Four regional evaluation accounts are used in this report:

- regional economic development;
- environmental values;
- community characteristics and quality of life; and
- specific Native community concerns.

Regional Economic Development

This account documents how the various options affect income and employment in the main sectors of the regional economy. Impacts can occur due to the direct linkage between land use/resource management and the level of activity in resource-dependent sectors (e.g., forestry, fishing and tourism). Direct impacts on resource-dependent sectors can have indirect impacts on other sectors in the region that provide goods and services to them or their workers. Both short and long term direct and indirect impacts on jobs and incomes in the Upper Skeena region are estimated in this report.

Environmental Values

The purpose of this account is to document how the different options affect environmental resources and attributes in the region. This account is not meant to duplicate the biophysical analysis of the options -- that is, it is not meant to merely summarize all environmental effects. Rather, it is intended to document the level and significance of impacts on non-commercial uses and values that people in the region attach to environmental resources affected by the options; that is,

- impacts on use values, i.e., impacts on environmental resources valued because of the human activity dependent on them (e.g., recreation); and

- impacts on non-use or existence and preservation values, i.e., impacts on environmental resources or attributes valued for their ecological, aesthetic or cultural significance (e.g., biodiversity, water quality, natural features).

Because of the difficulties in applying preservation values on an incremental basis, only the impacts of the options on user values are evaluated under this account.

Community Characteristics and Quality of Life

The purpose of this account is to document the social impacts that could result from the implementation of alternative forest land management options. Social impacts associated with these options would result primarily from changes in employment or changes in land use. For the purposes of the assessment for the Upper Skeena region, it is assumed that job reductions are the primary source of social impacts.

The major categories of social effects discussed are impacts on population, local government, social services, and social integration.

Specific Native Community Concerns

This account documents social and economic impacts on native communities in the region. It specifically attempts to identify the impacts of the various forest land management options on the resources on which the native communities depend.

For this assessment, it was not possible to provide a detailed analysis of impacts since representatives of the Gitksan-Wet'suwet'en bands did not wish to participate in the study.

2.2 Provincial Evaluation Accounts

While social and economic impacts of land management plans are more apparent in the region than the province as a whole, there still exists a provincial interest in regional resource use decisions. In order to document and assess the range of impacts that the options have on communities outside the planning region and on the province as a whole, four provincial evaluation accounts are used in this report:

- provincial economic development;
- provincial environmental values;
- provincial government finances; and
- economic efficiency of resource use.

The first two accounts parallel the regional evaluation, except that they address impacts from a provincial as opposed to regional perspective. Impacts on the provincial economy address job and income effects in communities outside the planning region and in the province as a whole. Impacts on environmental values address effects on use and non-use values of provincial significance, and sustainability and flexibility of future resource use from a provincial perspective. The other two accounts address other important provincial interests in the regional plan -- impacts on provincial government revenues and expenditures, and impacts on the net resource values or the quantifiable net economic benefits derived from the affected resources in the region.

Provincial Economic Development

The purpose of this evaluation account is to document how the options affect economic activity in communities outside the region and in the province as a whole.

Impacts outside the region can occur because of direct linkages to the resources within the region. For example, in forestry such impacts can occur because of the processing of wood outside the region; in fishing, impacts can occur because of the location of the harvest of affected fish stocks. A major component of the evaluation under this account is to document these spillover effects.

Impacts on economic activity in the province as a whole include all of the direct and indirect effects within and outside the region. The evaluation here will serve to document the total impact on output, jobs and income due to direct impacts within the region, direct impacts outside the region and interindustry indirect multiplier impacts in the province as a whole.

Provincial Environmental Values

The purpose of this account is to document how the options affect environmental resources and attributes of provincial significance. Paralleling the regional evaluation, this account would document impacts on use values (e.g. recreational activity of all B.C. residents) and impacts on non-use values that are of provincial significance and/or important within the context of provincial policy and objectives.

Provincial Government Finances

The purpose of this account is to document how the options affect provincial government net revenues. The two basic types of effects evaluated under this account are impacts on provincial government revenues and impacts on provincial government infrastructure or service requirements and expenditures. For instance, different options may affect forest-based government revenues, such as stumpage, as well as expenditures in forest management activities. Both effects are evaluated under this account and the net financial impact on the provincial government identified.

Economic Efficiency of Resource Use

The purpose of this account is to estimate the net value or quantifiable net economic benefits realized from the resources affected by the options. Net economic benefits refer to the revenues or benefits derived from the affected resources minus all of the public and private expenditures incurred to realize those revenues or benefits. In economic terms they refer to the resource rents that are generated. As resource owners, the people in the province have a general interest in the size of the net benefits or rents realized from the resources in any planning region. This account attempts to address this interest.

2.3 Summary of Evaluation Accounts

A summary of the evaluation accounts used in this report is provided below.

REGIONAL LEVEL ACCOUNTS	• Regional Economic Development • Regional Environmental Values • Community Characteristics and Quality of Life • Specific Native Community Concerns
PROVINCIAL LEVEL ACCOUNTS	• Provincial Economic Development • Provincial Environmental Values • Provincial Government Finances • Economic Efficiency of Resource Use

2.4 Data and Information Sources

Information for this report was collected from a variety of sources: including:

- published government sources;
- resource analysis by various provincial government agencies; and
- interviews with government, industry, native and user group representatives.

3.0 Base Case

Documenting the social and economic impacts of the different TSA management options on the people and communities within the region requires the definition of a base case as a frame of reference or basis of comparison. That is, the difference between the base case and what is expected to occur under each option defines its impacts. For the purposes of this analysis, the base case is defined as a continuation of the current TSA management plan. Given the constraints of this management plan and current inventory data and assumptions, the AAC has been established at 1.1 million m^3 per year.

It is important to recognize that the current AAC is not sustainable over the long term, with a reduction, or falldown, to Long Run Sustained Yield (LRSY) expected after approximately 80 years. Therefore, this base case does not mean economic activity in the region will stay constant at current levels.

Forest activity in the region will also be affected by changing economic conditions and technology. Also, activity in other sectors (e.g. tourism, trade and services) will change as a result of changing opportunities and circumstances. The discussion below outlines the base case in terms of the current economic situation in the Kispiox area and factors that might affect it in the future.

3.1 Current Profile and Trends in the Upper Skeena Region

The Upper Skeena region includes the District of New Hazelton, the Village of Hazelton, the communities of Cedarvale, South Hazelton, Two Mile, Kitwanga, Kispiox Valley and several Indian reserves, including Kitwancool, Kispiox and Moricetown. The total population in the region was estimated at 5,849 in 1986, widely distributed between 15 communities and the surrounding rural areas. The Upper Skeena region has experienced a consistent population growth of between 1% and 2% per year, due primarily to a large and stable native population that is characterized by high birth rates. The current Upper Skeena population is estimated at about 6,500 people.

Employment in the region is estimated to total roughly 2,100 people. Forestry is by far the largest source of employment. Other major sources of employment are institutionalized services (government, education, health, etc.), tourism-related services and other commercial services.

3.1.1 Forest Sector

The Kispiox TSA currently supports an AAC of 1.1 million m^3, originally set in 1981. Up to twelve logging companies operate in the TSA. Most of Kispiox TSA timber is processed by three sawmills and a whole log chipping plant in the Upper Skeena region. All of the chipping plant output is sold to the Skeena Cellulose pulp mill in Terrace. A small percentage of the TSA harvest is exported directly from the region via Stewart or Kitimat.

Two of the three sawmills and the chipping plant are owned and operated by Westar Timber Ltd., employing a total of 300 people. In February 1992, Westar's Carnaby sawmill was operating only one shift while its Kitwanga sawmill was temporarily shut down. Kitwanga Lumber owns the other sawmill and currently employs approximately 65 people. Isolite-Stege Logging Ltd. is scheduled to open a new mill in 1992 which is expected to employ 45-65 people in logging and processing. The B.C. Ministry of Forests employs 35 people to manage the Kispiox TSA. Silviculture also generates employment although many who take part live outside the region.

There are a number of factors which may affect future forestry activity in the region within the current forest management plan. Some factors could affect the resource base and harvest levels while others could affect the local forest industry.

The most significant factor affecting the resource base is a change in the operable land base. The existing operability lines were originally established conservatively using limited inventory data. Better inventory data could result in the extension of these operability lines into new areas, thus increasing the resource base and possibly expanding the TSA's AAC. On the other hand, many areas outside the current operability lines are in high conflict areas with respect to wildlife habitat or viewscapes, making the decision to expand the lines even more complex. A major factor that could substantially reduce the operable land base is the proposal to establish a Provincial park in the area, but the likelihood of such a decision is uncertain.

The forest sector could also be affected by a change in the mix of sawlogs and pulplogs harvested in the TSA. The current harvest of sawlogs exceeds the supply indicated by current inventory data by a small margin (3-5%). In past years, this margin was much greater. The possibility of a future shortage of sawlogs exists which would impact on processing activity. However, limitations of inventory data and the development of new processing technology preclude any definitive judgements at this time.

Harvesting deciduous trees in the TSA could also change the AAC. The Kispiox TSA contains an estimated 50,000 hectares of cottonwood, birch and aspen which could be harvested depending on the development of appropriate processing technology and the existence of hardwood product markets. However, many of the hardwood stands are in high conflict areas, making management decisions more difficult.

In the future, there may be some incremental silviculture in the region; however the impact on the resource base and harvest levels would not be great because of forest growth rates in the region. Also, timber utilization rates could change in the future due to technological advances or changes in commodity prices; however, relevant Ministry of Forests utilization regulations are not expected to change in the foreseeable future.

Each of the above factors could change the TSA's resource base and possibly harvest levels within the current forest management plan; i.e. based on a continuation of current practices and environmental constraints. Other factors could impact the industry directly. First and foremost are the fluctuating international markets in which Kispiox timber is sold. These market fluctuations will likely continue to occur in the future, affecting mills and forest workers in the region. Similarly, technological change has a history of impacts upon the British Columbia forest industry. Province-wide, technological change over the past decade has contributed to a significant decline in forest industry employment per m^3 harvested. Although forestry employment figures for the Upper Skeena region are not available for the same period, the situation is likely similar to the province as a whole. Future technological change will likely continue to reduce employment in the industry.

Also related to technology is the processing of Grade 4 logs. This timber currently goes into pulp production but new technology can produce some lumber from these logs, generating greater value and employment. Stege plans to install this technology in its new mill. Although no other installations are foreseen at this time, similar technology at other mills in the region could increase employment in the local forest industry.

Another potential change in the local forest industry could result from the sale of Westar Timber Ltd. There exists the possibility that a new owner would close one or two of Westar's mills to consolidate processing activity. Westar's Kitwanga mill appears to be particularly vulnerably to shut down in poorer market conditions.

Finally, significant interest exists in the potential for increased value added activity in the region which could increase processing employment. Up to five small companies currently manufacture various higher value products in the region. Stege Logging Ltd. has reached an agreement in principle with a value added manufacturer to build a plant at its new site. However, one local pallet manufacturer recently closed while another value added manufacturer is experiencing problems in starting up. No other prospects for further value added manufacturing are known at this time.

In sum, there area a number of factors that could increase or reduce future activity in the forest industry. Factors contributing to increased employment would be an expansion of operability lines, the harvest of deciduous species, favourable markets, greater processing of Grade 4 logs or greater value added processing. Factors contributing to decreased employment would be more land alienation (e.g., the establishment of a park), a reduction in sawlog supply, unfavourable markets, further labour-saving technological change or a reduction in Westar's operations following its sale. The actual future situation will depend on the interrelationship of all these and other factors.

3.1.2 Tourism

After forestry, tourism is the other major industry in the Upper Skeena region. Since the 1973 opening of the Cassiar highway, the Hazeltons have become a popular stop-over for Americans and Canadians travelling to Alaska and the territories.[1] This has resulted in increased activity in the local economy. The Upper Skeena region is also becoming increasingly recognized as a popular tourist destination. Quality scenery and recreational opportunities, such as fishing, hiking and camping are attracting growing numbers of wilderness and adventure tourists. Cultural attractions are also becoming more popular. The most significant cultural attraction is 'Ksan, a Gitksan village replica constructed in 1970. Other attractions include native villages and a large number of standing totem poles.

A 1991 survey identified 26 tourism operators known to operate in the Kispiox TSA, 14 of whom are based in the Upper Skeena region.[2] Tourism activities occur

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1 In a 1987 survey of visitors to B.C.'s northern areas, 53% of people reported their major destination to be outside B.C. See *Tourism '87: A Travel Survey of Visitors to British Columbia's North by Northwest Tourism Region*.

2 *Tourism Resource Values Assessment for the Kispiox Timber Supply Area* prepared for the Ministry of Development, Trade and Tourism and the Ministry of Forests by Janette Fricker, June 7, 1991.

throughout the TSA, although currently the most accessible and concentrated opportunities are within the south half of the region. Activities are seasonally distributed, with many operators diversifying their product offerings in order to benefit from various seasonal opportunities:

- guided and non-guided fishing and hunting;
- guided and non-guided wildlife viewing;
- guided and non-guided canoeing and kayaking;
- guided river rafting;
- guided dog sledding;
- guided and non-guided trail riding;
- guided and non-guided hiking;
- non-guided snow mobiling;
- non-guided ski touring;
- cultural and heritage tours;
- community based tourism activities (interpretive tours, K'san);
- touring (Highway #37, Highway #16, scenic drives);
- lodge based activities (day fishing, day hiking, day ski touring — may be guided or non-guided;
- wilderness camping.

Employment estimates for the tourism sector as a whole are unavailable. However, the Ministry of Environment has estimated in its analysis of the Kispiox management options that in 1989 the Kispiox TSA supported 82 person-years of direct employment (assuming 20% of Skeena Region total) in hunting and non-hunting wildlife-related activities. This estimate excludes non-hunting activities by non-residents, which, based on data provided in the study, could generate a further 10 PYs.[3] Overall, about 15%-20% of hunting and non-hunting wildlife-related employment, or about 15 PYs, were generated by non-residents. The same report estimates that in 1990, there were 30 person-years generated by sport fishing-related activities in the Kispiox (Assuming 15% of Skeena Region total). The study upon which the Ministry based its estimates suggests that 34% of employment was due to spending by non-locals.[4]

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[3] See Ministry of Environment, Fish and Wildlife Branch. *Fish and Wildlife Analysis of the Kispiox Timber Supply Area Consensus Report*. This estimate assumes that the ratio of hunting to non-hunting spending is the same for non-residents as it is for residents.

[4] ARA Consulting Group Inc., 1991. *Economic Impacts of the Skeena River Freshwater Sport Fishery*, prepared for the B.C. Ministry of Tourism, November, p. 2-3.

Tourism activity in the region has grown over the past decade and is forecast to continue growing if the basic conditions required to support the industry (e.g., scenery, wilderness areas, fish and wildlife populations) are maintained. Many operators interviewed in the above survey were considering expansion of their operations. An assessment of trends in the Kispiox area economy by the Planning Department of the Village of Hazelton estimates that employment in a fully developed tourism sector could reach more than 500 positions.[5]

3.1.3 Other Sectors

Mining has been significant in the past but there are no local producing mines at present. The potential exists to develop a number of small deposits between Smithers and Terrace using small portable mining operations. The development of appropriate technology and trends in gold and silver prices will largely determine whether these deposits are developed. The degree to which local residents have the necessary skills to participate in such operations will in part determine the regional economic impacts.

Small scale agriculture, producing beef and hay, occurs in the region with most farms operating on a part time basis. Two freshwater fish farms are also located in the region.

The government sector, particularly that related to aboriginal people, must also be considered in any assessment of trends in the Kispiox area economy. Government services (e.g., health care, social services and education) are likely to continue to grow in response to current underservicing in these areas and due to overall population growth. Federal spending in support of the region's aboriginal population already contributes about $25 million to the local economy. Aboriginal self-government, economic development initiatives, and ultimately, the resolution of land claims could be an important source of economic growth in the area.

3.1.4 Summary of Economic Trends

The forestry sector will continue to be the single most important generator of economic activity in the Upper Skeena area. However, overall employment in the

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[5] See D. Aberly, Village of Hazelton Planning Department, "Employment Impacts of Kispiox TSA Resource Management Plan / Trends in Upper Skeena Region Economy." A review of the employment estimate indicates that about one-half of the potential jobs are in commercial or culturally-oriented tourism activities such as hotels, restaurants and Native crafts, which are not directly dependent on wilderness and recreational opportunities in the TSA.

forestry sector is not expected to grow significantly. In fact, the historical trend of declining employment in the forest industry may continue. The primary sources of growth in the regional economy are likely to be the service sectors and aboriginal self-government and economic development initiatives.

4.0 Description of Options

Five forest land management plan options were developed through a local planning process: four initial options and a consensus option. All five options involve operable land bases and management prescriptions different from those in the current forest management plan and Base Case. The five options are designed to improve the industry's sustainability, reduce impacts on environmental attributes and respect non-forestry resource values. Each of the four initial options, A to D, are progressively more restrictive of timber harvesting in favour of other resources. The Consensus Option is a middle option. Brief descriptions of the options are provided below.[1]

Option A is the closest to the base case yet would still involve more harvesting restrictions in the TSA. Option A stipulates that 10% of the area in medium-sized (approximately 10,000 hectares) watersheds be conserved (not preserved) through deferral schedules. Timber production would occur in the majority of the TSA's planning units with harvesting in some units deferred pending resource inventories. Impacts on other resources would be mitigated through alternative logging systems, longer rotations and specially managed harvesting schedules. The maximum cut block size would be 100 hectares (ha). Visual foreground and highly sensitive landscapes around trails will meet a minimum Visual Quality Objective (VQO) of partial retention. Buffers which are selection harvested would be established at important headwaters and mouths of major streams.

Option B is similar to Option A in that it has the same impact on the Long Run Sustainable Yield (LRSY) but protects more non-timber values. Twelve percent of medium-sized watersheds (10,000 ha) would be conserved through deferral. The maximum cut block size would be 50 ha after 5 years. Visual foreground and highly sensitive landscapes would be managed for a VQO of partial retention. Buffers, with harvesting from selection to clearcut methods, would be established on major rivers and significant tributary streams.

Option C is more restrictive of timber harvesting than A or B. It would involve preserving 12% of climax forests in perpetuity. Another 58% would be managed according to "New Forestry" principles with the remaining 30% managed using

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[1] Source: Ministry of Forests, Fraser Forest District. The changes in the operable land base and harvesting practices in these options are not the same as those possible changes discussed in the context of the Base Case in Section 2.0. Those changes related to factors that could happen regardless of which forest management plan is adopted for implementation.

traditional methods. Up to 25% of the harvest would require cable yarding and more low ground pressure skidding would be used. The maximum clearcut size would be 50 ha. Timber harvesting would be deferred longer and in more planning units than Option B. Visual foregrounds would be preserved within 100 m of trails. Highly sensitive landscapes around trails and lakes would be managed for a full retention VQO. Buffers twice the width of main rivers and their tributaries would be created with 60% of the buffer areas preserved, 30% selection harvested and 10% clearcut harvested with cut-blocks or less than 10 ha.

Option D is the most restrictive option of the four with respect to timber harvesting. Twenty percent of each medium-sized watershed would be preserved along with 100% of some small watersheds. Wilderness areas would be created at Swan Lake, in the Babine Corridor and in the Seven Sisters area. Fifty-five percent of the harvest would occur using non-clearcut methods and 45% using clearcut methods. Two hundred metre preserved buffers would be established beside trails and lakes. Highly sensitive landscapes would be managed for a VQO of full retention. One hundred and fifty metre buffers would be established beside all streams. They would be preserved for 10 years after which the outside 75 m could be selection harvested. Overall, this option would involve a 25% reduction in the available operable land base.

The Consensus Option was developed after presentation of the initial Options Report to the public and consultation with user groups. It represents the option agreed upon by representatives from a number of resource interest groups. In general terms, it is a middle option which combines components of each of the four initial options. Harvesting would continue within the existing chart areas. Chart areas are where licensees plan their future harvesting, generally over a 20 year period. Clearcut harvesting would remain the principal method of harvest in the TSA; however, by year 5 of the plan, 50% of clearcut areas harvested annually within the TSA would incorporate "New Forestry" concepts. The maximum clearcut size would be 100 ha with the average clearcut size being 40 to 50 ha or less. Machine-free buffer zones would be defined around trails on a site specific basis. Highly sensitive landscapes would be managed for a retention VQO. Selection-harvested 150 m buffers would be established beside the Upper Kispiox, Suskwa and Kitsequecla Rivers.

The effect of each option on the AAC can vary depending on how quickly harvest levels are implemented; that is, depending on the transition strategy. If the current AAC is maintained, each option will differ in the timing of a falldown to Long Run

Sustained Yield (LRSY). Or, each option could require a different initial harvest level in order to attain a falldown at a certain time.

In Table 1, the five options are compared to the Base Case in two ways: the first (shown in row 1) is the degree to which a falldown to LRSY is advanced under each option, assuming continuation of the AAC at the current level of 1.1 million m^3; the second (shown in rows 2 and 4) illustrates the degree to which current harvest levels must be reduced to delay falldown to LRSY for 100 or 150 years.

TABLE 1
Comparison of Illustrative TSA Management Options

	Base Case	Options A and B	Option C	Consensus Option	Option D
Years to falldown to LRSY @ 1.1 million m^3 AAC	80	60	30	40	10
Required AAC for falldown after 100 years (m^3)		937 000	777,000 (90 yrs)	725,000	653,000
% Reduction relative to current AAC		14.8	29.3	34.1	40.6
Required AAC for falldown after 150 years (m^3)		833,000	686,000	675,000	581,000
% Reduction relative to current AAC		24.3	37.6	38.6	47.2

Source: MOF Kispiox Forest District

In the first row of Table 1, the advancement of a decline to Long Run Sustained Yield (LRSY) in the TSA's AAC due to each option is shown, assuming continuation of the AAC at 1.1 million m^3. The Base Case results in a decline to LRSY after 80 years. Options A and B advance it by 20 years, the Consensus Option by 40 years, Option C by 50 years and Option D by 70 years.

Rows 2 and 4 show the degree to which the AAC must be reduced under the five options in order to delay the falldown to LRSY to 100 and 150 years. To achieve a sustainable harvest for 100 years, the AAC must be reduced by between 15% and 41% under the different options. Even greater reductions in the AAC are required to achieve sustainable harvest levels for 150 years.

Table 1 does not show the required AAC under each option for a falldown after 80 years as is expected under the Base Case. The reason is because none of the options

can sustain a continuous harvest with a falldown to LRSY at 80 years.[2] Thus, when considering the impacts of options on the AAC, the differences from the Base Case reflect not only a reduction in the land base and changes in harvesting practices but also a delay in the timing of a falldown in AAC to LRSY.

The AAC scenarios shown in row 2 and 4 are used in the this study to illustrate the impacts of the five management plan options. It must be emphasized that the scenarios shown in rows 2 and 4 represent only two out of a number of ways in which AAC reductions in the Kispiox could be implemented to achieve LRSY harvest levels.

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[2] That is, with the reduction in operable land base and harvesting constraints implied by each of the five options, the forest will not regenerate in time to sustain continuous harvesting for 80 years. Harvesting in the TSA would stop for several years in the seventh decade. This is due to a combination of factors in the forest including the current age structure and regeneration period.

5.0 Assessment of Options

5.1 Regional Accounts

5.1.1 Regional Economic Development

Direct Impacts

(a) Forestry

Changes in the forest management plan can have direct impacts on employment and associated income in harvesting, processing, silviculture and administration. The time pattern of these impacts will depend on the timing of management plan changes.

Harvesting

Impacts on harvesting employment will be related to reductions in the volume of wood available from the TSA and the methods by which the wood is taken. Regarding methods, the most important factor is the degree to which selective methods, requiring more labour intensive harvesting, is required by the plan.

A harvesting employment factor of 3.703 m^3 per person-year (or expressed conversely, .26 PY/000m^3) is assumed for the Base Case management plan which primarily involves clearcut harvesting. This employment factor is based on estimates from the Cariboo Lumber Manufacturers Association.[1] All of the management plan options will involve more selective harvesting than in the Base Case. The use of selection methods will offset to some extent the reductions in harvesting employment due to reductions in AAC in these options. Based on estimates provided by MOF Vernon District, (where selective logging is more prevalent and in conditions similar to Kispiox) it is assumed that selective methods would require 30% more labour per m^3. Estimates of the mix of clearcut and selective logging associated with each of the management plan options (as provided by the Kispiox Forest District) are as follows:

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[1] Site specific data is unavailable but current harvesting techniques in the Upper Skeena and the Cariboo regions are similar.

TABLE 2
Harvesting Methods in the Five Options

Options	Clearcut (%)	Selective (%)
A & B	89	11
C	80	20
D	55	45
Consensus	89	11

It is assumed for purposes of this analysis that selective harvesting has the same time pattern as clearcut harvesting. It is also assumed that all of the harvesting in the Kispiox TSA is done by local residents.

Processing

The overall impacts of AAC reductions in the Kispiox TSA on jobs and income in regional processing facilities are estimated by means of employment ratios of .35 PY/000m^3 for sawmilling and .05 PY/000m^3 for chipping. These ratios are based on industry estimates of full production employment in local area processing facilities divided by associated timber requirements (see Table 3 below).[2] Based on currently available inventory data, about 60% of the AAC is comprised of sawlogs and 40% pulplogs. The impact of AAC reductions is therefore estimated as the product of the sawmill employment coefficient and sawlog portion of the AAC reduction plus the product of the chipping employment coefficient and the pulp log portion of the AAC reduction.

Impacts of AAC changes on local wood processors will depend on the availability and cost of timber from alternative sources. In light of current overcapacity of wood processing in relation to timber supplies in northern B.C., it is assumed that reductions in TSA AAC cannot be made up from other sources. However, it is assumed that supplies currently obtained by local processing facilities from sources other than the Kispiox TSA will continue in the foreseeable future. As shown in the table below, non-TSA sources currently provide about 38% of full production wood requirements of processing facilities in the Kispiox area. In the long term, as lumber markets recover, the ability of local processors to maintain their current levels of

[2] The current harvest level in the Kispiox and employment in local processing facilities is somewhat less than full production levels. However, it is expected that these levels will be attained in the near future once more typical wood product market conditions prevail.

non-TSA wood supplies will depend on their ability to compete for Small Business Forest Enterprise Program (SBFEP) sales and for supplies from private lands.

Based on data provided by and discussions with Kispiox Forest District and industry officials, estimates of current employment, timber requirements, and proportion of these requirements currently met from the Kispiox TSA are summarized below for each processing facility in the region.

TABLE 3
Employment and Timber Requirements of Kispiox Area Processing Facilities

Facility	Employment (PYs)	Timber Requirements (m^3)	Timber from TSA (m^3)	% Requirements from TSA
Westar				
Carnaby/Kitwanga	297	794,000[a]	431,000	54
Chipper	17	319,000[c]	319,000	100
Kitwanga	45	130,000[b]	110,000	85
Stege	50	200,000[b]	160,000	80
Bell Pole		58,000	58,000	100
Total Processing Facilities:	409	1,501,000	1,078,000	72
Total Sawmill Facilities:	394	1,124,000	701,000	62
Woodlot Licenses		n/a	11,000	n.a
Forest Service Reserve		n/a	11,000	n/a
Total TSA Requirement		n/a	1,100,000	n.a

(a) Requirements for 2 shifts
(b) Requirements for 1 shift
(c) Assumes chipper will process pulp logs from Westar's TSA license allocation and that Stege will bid away Kispiox SBEP pulp log volumes from chipper.

It is Ministry policy that reductions in the licensed portion of the TSA AAC will be prorated among license holders according to their current shares. Since the licensed timber comprises over 80% of the TSA AAC, it is assumed that the overall reductions will be prorated among each of the processing facilities based on the proportion of timber requirements now provided each mill directly or indirectly by the TSA.

The level and distribution of impacts of AAC reductions on local processing facilities will also be a function of the financial vulnerability and minimum throughput requirements of specific facilities. AAC reductions will likely increase bid

prices for SBFEP volumes which account for about 18% of the Kispiox AAC. Marginal mills, which may be more reliant on SBFEP volumes or which may be closer to minimum throughput requirements may suffer loss of an entire shift, or more frequent or complete shutdown. The likelihood of these "threshold" effects occurring will increase with larger reductions in the AAC being proposed, particularly in Option D.

Management and Administration

Currently, about 35 people are employed in management and administration activities in the Kispiox District. It is likely that all of the proposed management plan options, particularly Option D, will require more intensive silviculture and management. However, reductions in the operable land base and harvesting activity might have offsetting effects. Also funding for such activities is ultimately related to budgeting considerations rather than changes in management plans. It is assumed in this analysis that employment in silviculture and management will remain the same as under the Base Case.

Total Effects

As described in Section 4.0, to illustrate the effects of the 5 management options, two scenarios are assumed for each option. The first scenario assumes that the AAC is reduced to levels permitting sustainable harvest levels for 100 years before falldown to LRSY. The second scenario assumes an AAC set at levels which are sustainable for 150 years before falldown.

The direct income (in $1991) and employment impacts of these two illustrative scenarios for each of the five options is shown in Tables 4 and 5, below. It is important to note again that for all of the options, it is possible to alter harvest reduction scenarios in such a way that there are no AAC reductions in the short term (eg. within 10 years). Therefore, the impact estimates presented below represent potential job and income losses, the timing of which will depend on the implementation schedule of AAC reductions. However, the longer the delay in reductions, the sooner will be the falldown to LRSY. At the time of falldown to LRSY, there will be further job and income impacts in the region, but these impacts are not estimated in this study.

TABLE 4
Potential Direct Forestry Income and Employment Impacts of the Five Options Relative to the Base Case

Assuming Falldown to LRSY after 100 years

	Options A and B	Option C	Consensus Option	Option D
Annual Allowable Cut (m^3)	937,000	777,000	725,000	653,000
Potential Harvesting Job Losses (person-years)[a]	36	75	90	97
Potential Processing Job Losses (person-years)[b]	37	73	85	101
Total Potential Direct Job Losses (person-years)	73	148	175	198
Potential Reduction in Employment Income[c] ($ million)	3.4	6.9	8.1	9.2

(a) Includes allowance for offsetting impact of selective methods
(b) Assumes 60% of AAC reduction comprised of sawlogs and 40% pulplogs
(c) Based on estimate of average regional forestry incomes of $46,500 by industry sources

TABLE 5
Potential Direct Forestry Income and Employment Impacts of the Five Options Relative to the Base Case

Assuming Falldown to LRSY after 150 years

	Options A and B	Option C	Consensus Option	Option D
Annual Allowable Cut (m^3)	833,000	686,000	675,000	581,000
Potential Harvesting Job Losses (person-years)[a]	65	101	108	119
Potential Processing Job Losses (person-years)[b]	60	93	96	117
Total Potential Job Losses (person-years)	125	194	204	236
Potential Reduction in Employment Income[c] ($ million)	5.8	9.0	9.5	11.0

(a) Includes allowance for offsetting impact of selective methods
(b) Assumes 60% of AAC reduction comprised of sawlogs and 40% pulplogs
(c) Based on average forestry income of $46,500 from industry sources

(b) Tourism

Tourism is defined here as recreation and wilderness-related activities and expenditures of non-resident visitors.[3] Changes in the Management Plan can affect tourism activity in two ways: first, by affecting tourists' access to recreation or wilderness areas and resources, and secondly, by changing the quantity and quality of these areas and resources.

Most of the management plan options will better preserve tourism values, in the longer term at least, than the Base Case due to more environmentally and aesthetically sensitive harvesting. This does not mean that the options result in an improvement in absolute terms over time for such activities. In fact, even Option D, the most protective of environmental values, eventually results in erosion of some wilderness and recreation opportunities by the end of the rotation period. The point is that the analysis of the options below is relative to the Base Case management plan, not to the present day situation in which much of the Kispiox TSA is unlogged.

Option A and Option B will have similar environmental and access impacts as the Base Case. The other options, particularly Option D, will result in reduced access to recreation and wilderness areas since the logging road network will not be increased as rapidly or to the same degree as under the Base Case. However, as second and third logging passes occur, the Consensus, and Options C and D will better preserve the quantity and quality of recreation and wilderness tourism opportunities compared to the Base Case, by maintaining resources such as pristine scenery, fish and wildlife, lakes and rivers. The Consensus Option will result in similar impacts on tourism values as Option C.

It should be noted that only Option D and possibly C and Consensus (with proper management) would set aside sufficient land base for the establishment of a proposed new Provincial Park in the Kispiox area (see Section 5.1.2 below). However, the decision to establish a park in the area is to be made within two years and is largely independent of TSA management planning. Therefore, none of the Options, including the Base Case, would necessarily preclude a park in the Kispiox.

The magnitude of direct tourism-related employment and income gains arising from management plan changes is very difficult to estimate. There are a number of factors other than the quantity and quality of recreation and wilderness-related

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[3] It is assumed here that employment and income impacts will only arise from recreation and wilderness-related expenditures made by non-local participants. Changes in such expenditures by local residents is assumed to affect only the pattern, not the level of spending on goods and services within the region.

resources that affect tourism. For these reasons, it is more appropriate to consider tourism impacts in terms of potential rather than actual impacts.

The magnitude of direct employment and income gains arising from the management options, at least in the short term, are not likely to be large in relation to impacts on the forest industry itself, for the following reasons.

First, estimated current or even potential employment in the wilderness tourism industry in the Upper Skeena region is not large as a proportion of current employment in the forest industry. As stated in Section 3.1.2, total employment currently generated directly and indirectly in the Kispiox by hunting, fishing and other recreation and wilderness activities is estimated at about 110-120 person-years. Assuming an employment multiplier of 1.25 (see "Indirect Impacts" below), direct employment in this sector is approximately 90-95. The non-resident portion of this is estimated at approximately 25% or about 25 PYs. Potential direct employment generated by wilderness tourism could reach about 60-65 PYs, assuming full potential direct employment of 500 (see Section 3.1.2), 50% of which is wilderness-based, of which in turn 25% is tourism-related. Based on these estimates, potential direct employment in wilderness tourism is about 10% of current direct forestry employment in the area. Secondly, as discussed above, impacts on access or roaded opportunities somewhat offset, at least over the first 15 years, impacts on wilderness opportunities.

In view of this, it is assumed here that the Base Case and Options A and B would maintain the current number of direct recreation- and wilderness-related tourism jobs at about 25 per year. These options would likely increase roaded recreation opportunities, particularly in the short term, but not the wilderness-based opportunities which are the basis of the tourism sector in the area. It is assumed that all of the other options would permit growth in tourism sector, up to a maximum potential of 40 PYs annually (ie. almost a doubling of current levels) in Options C and Consensus, and up to 60-65 PYs annually (ie. between 2-3 times current levels) in Option D.

The potential direct employment and income gains in the wilderness tourism sector associated with the management plan options are summarized in Table 6 below. It is important to emphasize that changes in tourist-related activity would occur over time, as differences between the various options and the Base Case management plan become more significant.

TABLE 6
Potential Direct Tourism Income and Employment Gains of the 5 Options Relative to the Base Case

	Options A & B	Option C	Consensus Option	Option D
Assuming Falldown to LRSY after 100 Years				
Employment (PYs)[a]	-	15	15	40
Income ($ million)[b]	-	0.5	0.5	1.2
Assuming Falldown to LRSY after 150 Years				
Employment (PYs)	-	15	15	40
Income ($ million)	-	0.5	0.5	1.2

(a) Employment estimates derived as potential total direct employment in each scenario less potential in the Base Case

(b) Income estimates based on average income of $30,400 derived from Davis (see footnote 4, p. 26), adjusted to $1991.

(c) Other Sectors

None of the options significantly affects agricultural activities in the region.

Impacts of the options on possible mineral developments depend on whether a a park is established in the Kispiox and on Provincial policy regarding allowable resource extraction activities in wilderness areas outside parks. Under current policy, mineral extraction would only be prohibited in Class A parks. Although only certain management options would allow for the establishment of such a park, the decision to do so is basically independent of TSA planning. Therefore, it is assumed that, under current policy, mineral exploration and development would not be directly affected by the management options.

The only other sector potentially affected by changes in management plans with potential employment and income impacts is commercial fisheries. Most of the management options would result in lower impacts on fish habitat than the Base Case, which could increase production and therefore employment and income in commercial harvesting and processing. No estimates of these impacts have been made, although they are not likely to be large relative to forestry impacts. Any impacts would be primarily felt by commercial fisheries outside the region. There could be some potential for local commercial fishery impacts if in-river Native fisheries were commercialized.

Indirect Impacts

Changes in the management plan will also have indirect impacts or multiplier effects because of: (a) impacts on the amount of local purchases by the directly affected firms and (b) impacts on the amount of consumer spending by the directly affected workers. Multipliers developed by Davis[4] for the North region of B.C. (which includes the Upper Skeena) are used to estimate indirect employment and income effects. Davis estimated an income multiplier of 1.25 for the North region. He also estimated an employment multiplier for the region as indirect income divided by the average wage in service industries, the sector of the local economy which is most affected by respending effects.

Based on the above income multiplier, direct incomes estimated in Tables 4, 5 and 6, and an average wage in the service sector of about $30,400 (C. Davis, op. cit.), the potential net indirect employment and income impact of the various management options (i.e., forestry losses less tourism gains) is presented in Table 7. Indirect employment is calculated by dividing indirect income by an average wage of $30,400.

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[4] Davis, H.C., "Income and Employment Multipliers for Seven British Columbia Regions." *Canadian Journal of Regional Science*, 9:1, Spring, pp. 103-115, 1986. These multipliers only capture household respending effects. Inter-industry impacts are relatively minor at the local level. It could be argued that inter-industry impacts are in effect captured since Davis' multipliers for the North region of B.C. are probably overestimates for the smaller Kispiox area.

TABLE 7
Potential Indirect Income and Employment Impacts[a] in the Kispiox Area of the Five Options Relative to the Base Case

	Options A & B	Option C	Consensus Option	Option D
Assuming Falldown to LRSY after 100 years				
Forestry (Loss)				
Employment (PYs)	28	55	67	75
Income ($ million)	0.9	1.7	2.0	2.3
Tourism (Gain)				
Employment (PYs)	-	4	4	10
Income ($ million)	-	0.1	0.1	0.3
Net Indirect Impact (Loss)				
Employment (PYs)	28	51	63	65
Income ($ million)	0.9	1.6	1.9	2.0
Assuming Falldown to LRSY after 150 Years				
Forestry (Loss)				
Employment (PYs)	48	74	78	90
Income ($ million)	1.5	2.3	2.4	2.8
Tourism (Gain)				
Employment (PYs)	-	4	4	10
Income ($ million)	-	0.1	0.1	0.3
Net Indirect Impact(Loss)				
Employment (PYs)[a]	48	70	74	80
Income ($ million)	1.5	2.1	2.3	2.5

(a) Based on income multiplier of 1.25 and average income of $30,400.

Direct and Indirect Impacts

The estimated direct and indirect employment and income impacts of the illustrative management plan options for the Kispiox TSA are summarized in Tables 8 and 9 below.

As noted above, the estimates for the forestry sector are based on factors which assume a linear relationship between changes in AAC and employment. Also, these estimates are based on the assumption that AAC reductions are implemented immediately. Therefore, actual impacts, particularly in the short run (10-15 years) may differ considerably depending on how AAC reductions are actually implemented and the responses of forest companies to changes in wood supply, prices, and operating costs.

The job and income losses estimated below take into account the potential offsetting gains in wilderness and recreation-based tourism resulting from reduced, and more

environmentally sensitive harvesting. Estimates of these offsetting gains are also based on some simplifying assumptions, but are considered to reflect the order of magnitude of such potential gains relative to possible forestry impacts. Estimates do not include potential commercial fisheries impacts in the region, although these are not expected to be large.

TABLE 8
Summary of Total Potential Income and Employment Impacts in the Kispiox Area Relative to the Base Case

Assuming Falldown to LRSY after 100 years

	Options A and B	Option C	Consensus Option	Option D
Annual Allowable Cut (m^3)	937,000	777,000	725,000	653,000
Potential Direct Job Losses (person-years)	73	133	160	158
Potential Indirect Job Losses (person-years)	28	51	63	65
Total Potential Job Losses (person-years)	101	184	223	223
Total Potential Reduction in Employment Income ($ million)	4.3	8.0	9.5	10.0

TABLE 9
Summary of Total Potential Income and Employment Impacts in the Kispiox Area Relative to the Base Case

Assuming Falldown to LRSY after 150 years

	Options A and B	Option C	Consensus Option	Option D
Annual Allowable Cut (m^3)	833,000	686,000	675,000	581,000
Potential Direct Job Losses (person-years)	125	179	189	196
Potential Indirect Job Losses (person-years)	48	70	74	80
Total Potential Job Losses (person-years)	173	249	263	276
Potential Reduction in Employment Income ($ million)	7.3	10.6	11.3	12.3

5.1.2 Impacts on Environmental Values

This account documents the uses and attributes of the Upper Skeena environment valued by local residents, and assesses the extent and significance of the impacts of the different forest management options on these uses and attributes. It should be noted again, that although most of the management options will generally have less environmental impact than the Base Case, there will still be erosion of the current state of the environment, even in Options C and D.

Local Environmental Values and Attributes

As noted in the Community account (section 5.1.3), the existence of a high quality environment is considered by local residents as one of the most important features of the quality of life in the area. Pristine rivers, lakes and scenery with an abundance of fish and wildlife species are particularly prized by residents. Studies by the Ministry of Environment (see sections 3.1.2 and 5.2.4) suggest area residents spend almost 100,000 user-days in fishing, hunting and other recreation activities, representing a total willingness-to-pay value of about $2.4 million.[5]

The environmental values estimated above do not include the cultural and subsistence values of Native people, who comprise a large proportion of the local population. Native issues are discussed in a separate account below.

Biophysical Impacts

The five management plan options were analyzed by the Ministry of Environment and Ministry of Forests for their impacts on the environment and related values.[6] MOE's fish and wildlife analysis included habitat impacts for salmon, other fish, grizzly bear and moose, as well as impacts on biological diversity. The MOF analysis addressed the impacts on recreation opportunities which depend on these populations and lake and river resources. These assessments did not compare the impacts of management options with those of the Base Case, but with the current situation in which much of the Kispiox is unlogged. For this report, it is assumed that Option A is essentially equivalent to the Base Case in terms of its environmental impacts.

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[5] This estimate assumes that about two-thirds of the total recreational and wilderness use of the Kispiox is by local residents. See Section 3.1.2.

[6] See MOE. Fish and Wildlife Analysis of the Kisopix Timber Supply Area. 1991 and Biodiversity Analysis of the Kispiox Resource Management Plan. 1991. See also MOF. Recreation Analysis of the Kispiox Timber Supply Area. 1992.

Fish Habitat

According to the Ministry of Environment's assessment, Option A (which is roughly equivalent to the Base Case) will result in a reduction of fish habitat carrying capacity of one-half due to rapid harvesting, widespread road construction and early harvesting of low elevation timber near streams. Option B will have slightly less impact than Option A because of better protection of streams and slower rate of harvest and will result in a reduction in fish habitat carrying capacity of 1/3 by year 80.

Options C and D will result in about one-half the projected adverse impacts of Option A, or a one-quarter reduction in carrying capacity. The forestry management prescriptions provide for larger buffers adjacent to streams, better water quality control measures, access planning and deactivation and a longer green-up period. These practices combined with a slow rate of harvest and the utilization of new forestry practices to maintain some of the function of the mature forests will result in considerably less impact on streams and fish habitat.

The Consensus Option is very close to Option C in terms of its expected impacts on fish habitat but with some additional adverse impacts.

A summary of fishery biophysical impacts of the options is provided in Table 10. Impacts by year 100 are rated on a scale of +2 to -2 where:

+2 = much better than now
+1 = better than now
0 = same as now or little effect
-1 = worse than now
-2 = much worse than now.

TABLE 10
Summary of Fishery Biophysical Impacts

	Base Case/ Option A	Option B	Option C	Consensus Option	Option D
Estimated Impact on Fish Habitat Carrying Capacity	¼ reduction	⅓ reduction	¼ reduction	¼ reduction	¼ reduction
Estimated General Impact after Year 100 (+2 to -2)	-1.8	-1.4	-0.8	-1.0	-0.5

Source: Ministry of Environment, op. cit.

Lake Recreation

Lake recreation was evaluated by MOF based on the aesthetic values of areas around lakes and the range of lake recreation opportunities available, from roaded lakes with campsites to wilderness lakes with unspoiled viewscapes.

Relative to the Base Case, most of the options will provide less recreational access to lakes in the first 15 years. After 15 years, however, the options differ in their impacts on the quantity, and particularly the quality of lake recreation opportunities. Option A, which is the most similar to the Base Case, would have the greatest adverse impacts by establishing roads in most of the TSA's area. Wilderness and walk-in opportunities for lake recreation would be preserved only in those areas designated as wilderness or natural areas. In addition, foreground viewscapes at important recreation lakes would be managed for a VQO of partial retention only.

Option B recommended greater protection of lake foreground viewscapes (partial retention to preservation in some cases). However, due to the rapid pace of development in Option B it will start to have negative effects after the first pass and result in an adverse effect (but not a severe as Option A) by the completion of third pass.

Option C recommended foreground viewscapes and other sensitive landscapes around lakes be preserved. This combined with the other forestry management prescriptions (access planning, slower rate of harvest, new forestry practices) should result in a longer period of positive effects on lake recreation with a slightly adverse impact by the end of the third pass.

Option D will result in more positive effects for a longer period of time with only a very slight adverse impact by the end of third pass because of its more restrictive forest management prescriptions and more areas preserved.

The Consensus Option recommended protecting highly sensitive foreground viewscapes adjacent to recreational fishing lakes. By the end of the first pass it will begin to have negative effects and will end up with more adverse impacts than Option C after third pass.

The general effect of each option on lake recreation is summarized in Table 11. Effects at year 10 and at year 100 are compared based on a scale of +2 to -2.

TABLE 11
Summary of Impacts on Lake Recreation by Each Option

	Base Case/ Option A	Option B	Option C	Consensus Option	Option D
Impact at Year 10	+0.5	+0.5	+0.5	+0.5	+0.5
Impact at Year 100	-1.6	-1.0	-0.6	-0.4	-0.2

Source: Ministry of Forests, op. cit.

River Recreation

The effects of each option on river recreation were analyzed based on impacts of visual landscapes, fish habitat and stream sedimentation. As in lake recreation, all five options improve river recreation in the first 15 years by providing greater access after which the impacts vary.

Options A and B result in negative effects soon after access is created due to the type of forest management prescriptions.

Options C and D have less impact on river recreation by recommending large, mostly preserved buffers and preservation of foreground viewscapes along recreation rivers. These prescriptions combined with the use of new forestry practices, more areas being preserved and a slower rate of harvest result in positive effects lasting longer and less of a negative effect at the end of third pass.

The Consensus Option recommends that foreground viewscapes adjacent to recreationally important rivers be maintained. In addition, it recommends that buffers of up to 100 m on Class I streams, 75 m on Class II streams and 50 m on Class III and IV streams be created. These prescriptions contribute to this option demonstrating positive effects to year 70 followed by slight adverse effects (although less than Option C) at year 100.

In Table 12, the expected effects of each option on river recreation are summarized at year 10 and year 100 using a scale of +2 to -2.

TABLE 12
Summary of Impacts on River Recreation by Each Option

	Base Case/ Option A	Option B	Option C	Consensus Option	Option D
Impact at Year 10	+0.3	+0.3	+0.3	+0.3	+0.3
Impact at Year 100	-1.8	-1.5	-1.2	-0.9	-0.5

Source: Ministry of Forests, op. cit.

Wildlife Habitat

The Ministry of Environment's assessment indicates that all of the options will result in a reduction of grizzly bear habitat and population. Options A and B would have the greatest impact because of greater access and reduction of mature forest areas. Options C, Consensus and D will have about one-half the impact of A and B.

All of the management options have a positive impact on moose habitat and population in the early stages of regeneration after harvesting. After this period, (year 20-25) only Options C, Consensus and D would maintain positive effects due to the slower rate of harvesting and new forestry techniques which will maintain some of the functions of the older stands in harvested areas.

Other species (e.g., furbearers, song birds, grouse) would be affected by the various management options in a manner similar to that identified in the bio-diversity analysis below.

Biological Diversity

The Ministry of Environment and Ministry of Forests undertook a joint biological diversity analysis of the options, based on an assessment of the number and diversity of plant and animal species. The analysis suggests that all five options will improve the level of biological diversity in the TSA over the next 50 years. This is due to a continuation of first pass harvesting of relatively homogeneous stands of first growth timber and the subsequent increase in deciduous species. Beyond 50 years, the options vary in their impact. Options A and B begin to substantially reduce biological diversity and continue to do so throughout the rotation period. Option C begins to reduce biological diversity but leaves it at the present level of biological diversity after 100 years. Only Option D improves biological diversity throughout the rotation period. The impact of the Consensus Option on biological diversity falls between Options B and C but closer to Option C. The impacts of the options are summarized in Table 13.

TABLE 13
Impacts of the Options on Biological Diversity

	Option A	Option B	Option C	Consensus Option	Option D
Impact at Year 10	+1.1	+1.1	+1.1	+1.1	+1.1
Impact at Year 100	-2.0	-1.5	+1.0	+0.2	+2.0

Source: Ministry of Environment, op. cit.

Significance of Biophysical Impacts for Environmental Values

The bio-physical assessments show that in short term, all of the options result in improvement compared to the Base Case for environmental attributes such as lake and river recreation and biological diversity, but erosion of fish and grizzly habitat. In the long term, significant differences between options emerge. Options C, Consensus and D generally have one-third to one-half the impacts of Option A (which most closely reflects the Base Case) and Option B. For some environmental attributes, the differences in long term impact are even more pronounced. For example, with respect to bio-diversity, Options C, Consensus and D continue to maintain or improve conditions, while Options A and B begin to substantially reduce diversity.

It is difficult to assess the significance of the above biophysical impacts for affected communities or residents. The most important impacts would be on the level and value of recreational, wilderness and subsistence uses over time. Similar to the analysis of tourism impacts, it is suggested that the impact of the Base Case, Option A and Option B would be no net growth in the overall value (ie. the product of user-days and the value of these user days) of various recreational and wilderness activities by residents of the area. This is based on the assumption that any short term increases in access and roaded recreation would be offset by erosion in the quality and quantity of wilderness opportunities and eventually, recreational opportunities as well. Subsistence harvests, particularly of certain fish and wildlife species which are more sensitive to habitat disruption, would likely decline over time under Options A and B.

Despite the fact that Options C, Consensus and D result in some erosion in the current state of the environment, it is assumed that the reductions in operable area and more environmentally sensitive harvesting practices would permit some growth in overall recreational and wilderness values and would stabilize subsistence harvests

at near current (Option C, Consensus) or current levels (Option D). Growth rates in the total value of wilderness and recreational activities by residents are assumed to be 1% under Option C and Consensus and 2% under Option D. These growth rates are not considered unreasonable. For example, population in the region and B.C. is increasing in a similar range. However, the assumed differences in growth rates between the various options are somewhat arbitrary.

There is no attempt to estimate here the impacts of the various options on non-use value, that is, the so-called preservation or existence value, of the Kispiox TSA by residents. These values are real and estimates for various regions in B.C. have been made,[6] but it is very difficult to apply such estimates on a marginal or incremental basis.

5.1.3 Community Impacts

The purpose of this section is to identify the potential social impacts of the forest management options under consideration on the communities in the Kispiox TSA. The discussion concentrates on the non-native communities in the area; spokespeople for the Gitksan-Wet'suwet'en stated that they did not wish to participate in the study. Nevertheless, there is reference throughout the section to the communities of both cultures, since there is a close interrelationship among them.

Also discussed in this section are the local government revenue implications of the various options.

Context

Community Goals and Values

It is recommended in the evaluation *Guidelines*[7] that generally pre-assessment consultation be conducted in order to determine the relevance of the social indicators and to identify community goals. In the Kispiox TSA, the communities had recently participated in a number of consultation processes (for example, the Ministry of Forests resource management options study and the commission to investigate the potential sale of Westar Timber). The local Ministry of Forests Office agreed that additional meetings involving the same groups of local citizens

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[6] For example see Ministry of Forests. *Outdoor Recreation Survey 1989/90*. Oct. 1991.

[7] Marvin Shaffer & Associates, op. cit.

would not be welcome at present. Instead the consultant met with 23 individuals and one small group of residents and interviewed them about overall community goals, the appropriateness of the social indicators being employed, and the potential social impacts associated with the five forest land management options under consideration. Interviewees were selected to represent diverse viewpoints.

Community goals were derived from the interviews and from planning reports. These goals, which are not ranked in order of importance, include the following:

- the development of a stable and diversified local economy;
- sustainable, environmentally sound patterns of resource use;
- local control over resource use and economic development;
- the maintenance of community stability; and
- the preservation of a high quality environment.

There was basic agreement with the indicators proposed for the social impact assessment. One addition was suggested: that the assessment consider the importance of wilderness values to the residents of the area. This issue is discussed under the social integration section.

Summary Employment Impacts

The employment impacts of the five forest land management options (A, B, C, D, and Consensus), relative to the Base Case, are the sources of the potential social impacts. These impacts are summarized in Tables 8 and 9.

The base case was described in Chapter 3.0. It is assumed that the base case can be represented by the status quo conditions in the region in terms of direct forest employment. The total number of forestry jobs at present is roughly 300 in the harvesting sector and 400 in the processing sector.

For the purposes of this assessment, it is further assumed that the AAC reductions presented in this report to illustrate the options will be implemented immediately; that is, that the projected job reductions associated with the selected option will occur quickly after implementation.

Population Impacts

The current population of the Upper Skeena region is described in Section 3.1. It is likely that the population will continue to grow at the rate it has demonstrated during the past five years (that is, about 1% to 2% annually)[8], unless there are major unforeseen developments. The high degree of stability of the regional population is evidenced by the fact that economic upheavals experienced in the late 1970s and mid 1980s had no major impact on the population of the area. Area residents have found ways to survive difficult times by making the adjustments necessary to keep their homes in the region rather than relocating. Those that choose to stay might not have been "employed" in the traditional sense but they made ends meet through barter and other alternative economic systems. Native residents were equally or more likely to remain in the area, relying on subsistence fishing or hunting if they temporarily lost their jobs. One major influence on regional population growth during the last few years has been Federal Bill C-31 which enabled persons of 25% or greater Indian ancestry to reclaim Indian status and to receive subsidized on-reserve housing. This has resulted in the construction of 150 new homes on reserves in the area since 1986. It is expected that this legislation will continue to contribute to population growth on reserves in the Kispiox TSA.

Total (direct and indirect) estimated job reductions associated with the five illustrative AAC reductions in the options range from a minimum of 100 positions under Option A to a maximum of 276 under Option D. As outlined in *Guidelines for Social and Economic Impact Assessment of Forest Land Management Options*, an initial estimate of the amount by which population may change as a result of changing economic circumstances can be obtained by multiplying the total employment effects by an estimate of average family size per employee. Average family size per forest sector employee is not available for the region. However, Statistics Canada figures (1986 Census) indicate that average family size for the Native communities is 4 persons and for non-Native communities is 3.5 persons. For making an initial assessment of population impacts, the average of these figures (3.75 persons) was multiplied by employment figures. The resulting estimates of the number of residents that could potentially be affected by job reductions is shown below.

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[8] Village of Hazelton. *Economic Development Profile and Strategy: Hazelton, B.C. and the Upper Skeena Region*. December, 1991.

Options	Number of residents affected by employment reductions
Option A	375 to 650
Option B	375 to 650
Consensus Option	835 to 985
Option C	690 to 935
Option D	835 to 1035

It is important to note that these figures cannot be directed translated into the number of people who would leave the region given these job losses. It must be emphasized that these numbers are illustrative only, and portray a "worst case" scenario. The amount that the population actually changes would depend on a number of other factors, such as family characteristics and quality of life, that influence the stability of the population.

Based on observed responses to past changes in employment in the area, it is unlikely that implementation of Options A or B would result in an exodus of residents. It is more likely that many of the individuals affected by job reductions would make adjustments in lifestyle (by selling a second vehicle, for example) create their own employment, or shift to work in another field (construction projects) for which they were qualified. Implementation of the Consensus Option or Options C or D, on the other hand, has the potential to be far more disruptive since the number of people potentially affected by job reductions relative to total area population is far greater.

It is difficult to determine at which point there would be movement out of the region due to employment reduction. Factors such as the exact numbers and positions that would be eliminated, the availability of retraining programs, and the willingness of forest sector employees to shift to another field of work would all influence population size. Nevertheless, regardless of which option was implemented, the reality of life in the Upper Skeena region is a heavy dependence on the forest sector. There is a limited number of alterative employment opportunities in the region and many of the jobs that are available offer comparatively low wage scales relative to the forest sector.

There are additional factors that complicate assumptions about employment reductions related to the forest land management options. For example, there is the possible sale of Westar Timber which is the largest employer in the area. A new owner may attempt to consolidate processing activity and close existing Westar mills.

which in itself could have a big effect on regional employment. Another factor, though admittedly a minor one in terms of counteracting major forest sector layoffs, is the possibility of new job creation as a result of increased silvicultural activity or the preservation of more non-timber values (for example, wilderness tourism jobs). A third overriding issue is the Gitksan-Wet'suwet'en land claim and the potential effect its resolution could have upon the future resource management.

Bearing all of these uncertainties in mind, it is critical to interpret the population impacts as preliminary, order-of-magnitude only.

Impacts on Local Tax Base

The most important impact of management plan changes on local government finances is the potential loss of industrial property taxes arising from mill closures. In the event of a mill closure, taxes are not assessed on the basis of the assessed market value of the property and equipment, but on the basis of a much lower closure allowance. This closure allowance is generally equivalent to the value of the land plus 10% of the value of improvements on major industrial property. In the event of a mill closure, the tax contribution to the local communities would fall significantly, although not to zero. The tax contribution of these mills to Hazelton and to certain services in the Regional District can be substantial. It is unlikely that the level of services in the area would be reduced, unless agreed to by referendum. Therefore, other property taxpayers would likely pick up the shortfall.

As noted in Section 5.1.1, mill closures are more likely to occur with larger reductions in AAC. Even in these cases, the likelihood of any mill closure in the short to medium term will depend on how quickly AAC reductions are implemented. Based on its heavy reliance on wood supplies from outside the Kispiox TSA and Westar's public statements about financial losses being incurred, it appears that Westar's Kitwanga facility is the most vulnerable to closure in the region. However, it should be noted that the viability of the Kitwanga mill is already questionable regardless of changes in AAC, due to current Westar overcapacity in relation to its TSA holdings.

Residential tax revenues could also be affected by management plan changes to the extent that job losses resulted in out-migration, reduced assessments due to forced housing sales and tax defaults. However, out-migration would also be eventually accompanied by offsetting changes in the need for and cost of municipal services. Commercial tax revenues might also be affected as a result of multiplier effects, if impacts were significant enough to result in closure of forestry-related and other

businesses. The likelihood of such closures is difficult to assess but will be greater in Options C and D. Ultimately, any tax revenue losses in the residential and commercial sectors would be made up by other property holders in the area.

Social Service Impacts

A complete listing of government, health, education, and recreation and voluntary services in the study area is contained in the *Economic Development Profile and Strategy: Hazelton, B.C. and the Upper Skeena Region,* December 1991. Among this range of services it is expected that the impacts of the forest land management options under consideration would mainly affect the following:

- community mental health;
- education and retraining;
- law enforcement; and
- community social services.

Community Mental Health

Community Mental Health offices, located in Wrinch Hospital in Hazelton, provide mental health counselling and referral services to residents of the Upper Skeena region. The staff includes four counsellors: one full time, two at four days per week, and one at three days per week. At any given time the staff handles from 60 to 80 cases. Most counselling needs are related to family violence, alcohol and drug abuse, sexual abuse, and chronic mental problems, such as depression. Some cases are referred for psychiatric evaluation in a larger centre such as Smithers or Prince George; substance abuse cases may be referred to a local treatment centre in Kitwanga.

The main gaps in services are in the areas of group therapy, preventative work, educational workshops and in meeting the needs of self-development cases. Due to insufficient staff and other resources, only the most urgent cases can be accommodated. The heavy case load also precludes setting aside time for planning and policy development.

Data concerning the cases handled by the organization are strictly confidential. However, the staff stated that they have observed a high degree of correlation between the number of clients seeking assistance and the unemployment rate. In the last three years especially, during mill closures or temporary shutdowns, the incidence of depression, alcohol and drug abuse and associated violence has risen.

Community Mental Health staff are concerned that chronic high levels of unemployment will further demoralize the residents of the area and exacerbate the existing problems of substance abuse and family violence. Employment reductions of any magnitude are likely to place additional demands on Community Mental Health services, since it is the entire family of the displaced employee that is affected by a layoff and potentially in need of mental health counselling. It should be noted that demands for increased mental health services would not occur immediately but would be expected to rise several months after layoffs were implemented.

Under Options A or B, it is likely that the increasing numbers of people seeking mental health services would at least result in long waiting lists to see a counsellor and, at worst, a lack of access to services for all but the most pressing cases. Under the Consensus Option, Options C or D, in which major employment reductions would be experienced, it is likely that Community Mental Health services would be unable to cope with the resulting demands and would require additional funding to acquire more staff and other resources.

Education and Retraining

Northwest Community College in Hazelton is one local facility that provides a number of alternatives for adult education or retraining. The college currently offers three ongoing courses that are designed to upgrade and retrain . The first is an Addictions Resource Worker program which is a ten month certificate course that graduates para-professionals. This program was initiated with the Gitksan-Wet'suwet'en and it has a unique cultural focus. Graduates are working in treatment centres, for native Bands and in schools. The second course is an adult basic education program for people who did not complete high school beyond grade 9 or who lack specific prerequisites for college. The third course is a two year Forestry Technicians program. To date, graduates have had no problems finding jobs in the region, either with the major forestry companies or with the Ministry of Forests.

The second educational institution that could assist in retraining is the Gitksan-Wet'suwet'en Education Society (GWES). The society is responsible for assessing the retraining needs of the local native communities and meeting those needs. GWES currently offers a Territorial Land Management program to provide instruction in resource management on native claim territories.

The potential impact of forest sector job reductions on these programs is unlikely to be felt in the short term. Some people interviewed for this study felt that workers

displaced from forest sector harvesting or processing positions would initially shift to jobs that may be required as a result of new forest land management techniques. Once these positions were filled, other displaced workers could seek work in other fields or prepare to accept a period of unemployment before they considered retraining or upgrading their skills.

A recent study completed in Washington State showed that loggers facing job losses had no plans to acquire alternative job skills. Millworkers were less tied to their occupation but were sceptical about prospects for retraining.[9] It is possible that displaced forest sector workers in the Upper Skeena region would demonstrate similar reluctance to enter a retraining program. Considerable planning and long term financial support would be required to provide retraining at any scale, but especially for the large numbers of forest sector employees who could lose their jobs if the Consensus Option, or Options C or D were implemented.

When local residents did express a desire for retraining they would certainly be more likely to take advantage of local facilities and programs. One positive feature of Northwest Community College is that as few as 10 students can make a course viable. Therefore programming can respond quickly to local needs.

Law Enforcement

The local RCMP detachment is located in New Hazelton and patrols Highway 16 from Moricetown to Cedarvale and Highway 37 from Kitwanga to the Cranberry River. There are 11 officers in the detachment; 7 of them have responsibilities for particular Indian reserves and schools. The detachment has more members per capita population than similar sized detachments elsewhere in the province.

The majority of crimes investigated by the force are spousal assault and family violence and thefts from small businesses and organizations. Recently the force has been dealing with problems associated with rising tensions over forestry related issues. Several months ago, a blockade was erected by a group of native people, cutting off access to the Kitwanga Valley. In early February a number of non-natives threw Molotov cocktails at the blockade causing some damage, though no injuries. Criminal charges will be laid against the responsible individuals. The view of the RCMP is that there is limited tolerance between the cultures over this issue and that it would not take much to spark a major incident.

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[9] Northwest Policy Centre and the Graduate School of Public Affairs. University of Washington. Seattle. *Revitalizing the Timber Dependent Regions of Washington*. 1991.

The RCMP believes that there are there are three main factors responsible for criminal activity in the region. The first is high levels of unemployment. The second, which is closely tied to the first, is alcohol abuse. The third factor is the uncertainty generated by the unresolved land claims issue.

Although the RCMP members contacted for this study were reluctant to draw any conclusive link between the unemployment rate and the crime rate, they generally feel that law enforcement could become more demanding given additional economic upheaval and associated stress for local residents. The large scale disruption that could result from job loss under the Consensus Option, Options C or D would certainly have the greatest potential to increase the demands on the RCMP detachment.

One mitigating future development that will alleviate demands on the RCMP is the current plan to institute an all native police force on the area's Indian Reserves. The Attorney General of British Columbia has an agreement with the Gitksan-Wet'suwet'en to accomplish this, in the next three to five years. The RCMP is working with the Gitksan-Wet'suwet'en to develop a native force; eventually the Hazelton detachment will be able to reduce its number of officers.

Community Social Services

The Ministry of Social Services and Housing (MSSH) office in Hazelton provides three basic services to its clients: financial assistance ; family counselling and, rehabilitation programs designed to assist clients to reenter the work force. The financial assistance programs, called "Programs for Independence", provide support to individuals and families who are waiting for Unemployment Insurance benefits to start or who have no other means of support. Assistance is provided for food, shelter and emergency items such as house repairs. In the last five years there has been a significant increase within the MSSH region (including Hazelton, Smithers, and Houston) in those clients awaiting UI payments who seek assistance. In December 1988 there were 10 such clients; in December 1991 there were 91 clients. Over the entire region, the caseload is increasing and is currently at its highest point in the last five years.

Social workers at the MSSH office in Hazelton provide family support and counselling, especially related to child protection. (Child protection is the only service provided by MSSH on Indian reserves in the area.) Although all information related to clients is confidential. MSSH staff did make the general observation that there is a close tie between the state of the local economy and demands for family

support services. Economic problems produce family pressures that can lead to family violence and family breakdown.

The third category of services provided are employment opportunities and wage subsidy programs. Through Community Tourism and Environment for Youth, MSSH will pay up to 100% of the wages of the participants. The Forestry Enhancement Program employs people on income assistance to do brushing and weeding for the Ministry of Forests, who pay the wages. All of these programs are very important means of getting people off income assistance in the Hazelton area.

Since unemployment is the major determinant of the demand for MSSH assistance, it is likely that the greater the job loss, the greater the impacts on MSHH resources. Job reductions would result in more UI applicants seeking temporary assistance, and ultimately, in more people seeking financial assistance. As the numbers of financial assistance clients increase, there is more demand for job rehabilitation programs, so that the entire spectrum of MSSH services could be affected. Implementation of Option A or B would result in larger caseloads for MSSH staff. Implementation of options specifying the loss of hundreds of jobs (Consensus Option, Options C or D) would likely create large demands on current MSSH staff and ultimately require additional staff to be assigned to the area.

Impacts on Social Integration

This section summarizes existing characteristics of social integration and assesses the potential effects of the forestry land management options on these characteristics. The four characteristics included here are: community stability; community cohesion; leadership and decision-making; and lifestyle and quality of life. The discussion is based on a limited interview program (with 23 area residents) and reflects the perceptions of these individuals only.

Community Stability

There has been considerable discussion about the concept of stability in forestry dependant communities.[10] For the purposes of this study, stability is defined simply as the community's ability to cope with changing economic circumstances.

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[10] D. LeMaster and J. Beuter, eds. *Community Stability in Forest-Based Economies. Proceedings of a Conference in Portland, Oregon*. November 1987.

For some time, the communities in the study area have been subject to the cyclical swings that characterize the forest industry. Market conditions, blockades and the possible sale of Westar Timber have contributed to the present instability. Nevertheless, economic ups and downs are a feature of life for residents of the Upper Skeena region. Based on recent history, it appears that they have the ability to cope with periods of unemployment and an uncertain economic outlook. People are self-reliant, willing to temporarily change jobs if jobs are available, or to remain home while a spouse works.

One issue related to community stability is the unresolved state of the Gitksan-Wet'suwet'en land claims. The current situation makes it very difficult for either the native or non-native communities to plan their futures and contributes to a sense of uncertainty about the future. A widely held view, according to those people interviewed for the study, is that the settlement of the land claim would benefit both cultures and allow everyone to get on with their lives.

The potential impacts of the forest management options on community stability especially those stipulating major job loss, would be very significant. From the perspective of local residents already facing layoffs in the industry, the prospect of any additional reductions in employment would be viewed as threatening. The loss of jobs all at once would be a disruptive force in the communities.

Residents have demonstrated considerable resilience in coping with previous periods of instability. However, the projected employment reductions associated with the Consensus Option and Option D in particular, would be major, relative to the existing number of forest sector jobs, and permanent. The potential impacts of these employment changes are certainly more extensive than those associated with the temporary economic ups and downs that have occurred in the region.

It should also be pointed out that the impacts of job losses, and therefore the impacts on community stability, would be experienced differently in the various communities. The Native communities would likely be severely affected since forestry provides a significant share of jobs for Native people. Native people are less likely to leave in search of new work and less likely to have the skills to obtain jobs that are available in other fields. Therefore, major job losses have the potential to be very detrimental to the stability of the Native communities.

In the long run, community stability would be enhanced by prescriptions for biodiversity and the preservation of non-timber values (most developed in Options C and D), since these would contribute to economic diversification and environ-

mentally sound patterns of resource use, both of which are stated goals of the communities. But it is employment opportunities that are far more vital to the maintenance of long term community stability.

Community Cohesion

Community cohesion is defined as the degree of cooperation and mutual support among community members. In the study area it is mainly a function of the relationship between the two cultures.

For the most part, there seems to be good will and a cooperative spirit between native and non-native communities. They are in close proximity to one another and share many facilities such as Hazelton High School which was the first integrated secondary school in British Columbia. Both cultures have worked together to develop 'Ksan Historic Indian Village and Museum, to create programming at Northwest Community College, and to facilitate other projects that are mutually beneficial.

Some people feel that relations between the cultures have degenerated in the past few years and they attribute this in part to the unresolved state of the Gitksan-Wet'suwet'en land claims. Under these circumstances, it is difficult for the cultures to participate in each other's planning processes and both feel frustrated by political uncertainties. However, as discussed above, there seems to be a large degree of non-native support for the settlement of claims. Many people apparently feel that the resolution of the land claims will grant more local control (native and non-native) over resource development.

Considering the position of the Gitksan-Wet'suwet'en people that no resource use decisions be made until the resolution of their land claim, the implementation of any one of the options could lead to a deterioration of relations between the cultures.

Leadership and Decision-Making

The Upper Skeena region population demonstrates a very high degree of participation in local government and decision-making; there are over 100 elected officials in the communities. The Village of Hazelton in particular has played an instrumental role in local development and in attempting to control the nature of resource extraction in the area. The Village produced a "Framework for Watershed

Stewardship"[11] that proposes an alternative management system for natural resource management in the province. There is a great deal of interest among residents in building up the resource management capabilities of the local population. Residents are tired of outside interests (corporate or government) controlling their economic fate.

The implementation of any of the options under consideration would negate to some extent the desire of the community members to shape their own fate. The Ministry of Forests process that evaluated the original four options and developed the Consensus Option certainly did include local residents. But the focus was on resource user groups, including some from outside the region. In addition, the Ministry had to operate under time constraints and the need to balance local and provincial interests.

These comments are not intended to diminish the success of the Ministry process in bringing together a wide cross-section of non-native community members to discussion some hard-to-resolve issues. However, in terms of local decision making, the option development process would have been more widely supported by non-natives if the local communities had played a stronger role. Until there is more broadly based participation by local residents in the refinement and selection of the most acceptable option, the community goal of increased local control over resource development will not be realized.

Lifestyle; Quality of Life

Quality of life in the study area is defined by a number of factors; two that are relevant here are the presence of a high quality environment and the presence of opportunities for satisfying work.

Pristine rivers, spectacular vistas, and an abundance of fish and wildlife species are the kinds of environmental values that are prized by local residents. Some people are concerned that these resources are in jeopardy, in part due to current forestry practices that endanger long term sustainability. Several interviewees felt that quick action must be taken to reverse existing trends.

Employment opportunities in the study area are in short supply. There is uncertainty in the forest sector due to proposed changes in management practices and in

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[11] Village of Hazelton. *Framework for Watershed Management*. March 1991.

corporate ownership. It is no longer possible for young people graduating from the local high school to assume that a job like their parents' jobs, particularly if forest-related, will be waiting for them. Stress associated with unemployment is taking a toll on many families.

The prescriptions of Options A and B would have the least significant effects on lifestyle in that they affect the least number of jobs. At the same time, they provide the least protection for non-timber values and so do not contribute to environmental sustainability. The scale of job reductions associated with the Consensus Option and Options C and D would certainly affect lifestyle by eliminating most opportunities for well paid jobs. Option C may be considered the most appropriate compromise between job retention and environmental protection.

5.1.4 Specific Native Community Concerns

The *Guidelines* specify that a main purpose of the evaluation in this account is to identify potential impacts on native communities' commercial, cultural, and traditional uses of resources in the area, then to estimate the nature, magnitude, and significance of these impacts. Section 5.1.2 identifies the potential biophysical impacts of the various options for native subsistence activities. Options A and B would likely lead to a decline in subsistence opportunities through increased road access and subsequent effects on wildlife populations. Option C and the Consensus Option would initially cause a decline in subsistence activity but with proper management this could be stabilized over time. Option D would maintain opportunities for subsistence at current levels.

The other major impact of the management options on the Native community will be on employment opportunities in the forest sector. Options which better preserve Native subsistence values will mean increased unemployment among Native people in the forest sector. However, the significance of these losses may be viewed differently by the Native community in light of other opportunities that are likely to be developed through economic development, self-government and land claims initiatives.

Apart from this very brief assessment, no further evaluation of impacts on native communities was possible for this report because the Gitksan-Wet'suwet'en do not wish to participate in resource planning exercises that do not recognize their claim to lands in the study area. Therefore this section of the report is confined to a brief discussion of their position and their major concerns, as indicated by the native people interviewed for this study.

No representatives from the Gitksan-Wet'suwet'en participated in the local Ministry of Forests planning process to evaluate the four original forest land management options and to develop the consensus option. Members of the native community contacted for this study believe that that process did not allow for meaningful native involvement; that the affected chiefs would have to be included in the final decision making before they would consider participating. Their basic position is that the land does not belong to the Province and that no decisions about land use in the region should be made until the Gitksan-Wet'suwet'en land claim is resolved.

There are a number of important native issues that could be affected by the proposed changes in forest land management. These are summarized below:

- the resolution of the question of land ownership and jurisdiction;
- the preservation of a high quality environment;
- the development of sustainable land management practices that protect the rights of future generations to the resource base; and
- the provision of training and secure employment opportunities.

5.2 Provincial Accounts

5.2.1 Provincial Economic Development

The impact of changes in the management plan on the provincial economy includes job and income impacts within the region as estimated above plus the impacts on other regions of the province. Direct impacts on other regions in the province not already estimated in Section 5.1.1 above, could be felt in forestry, commercial and recreational fisheries and tourism industries. Indirect impacts are also generated province-wide as a result of respending by industries and households within and outside the Upper Skeena.

Direct Impacts

(a) Forestry. Pulpwood and mill waste from the Kispiox TSA supplies approximately 10-15% of requirements for the Skeena Cellulose pulp mill in Terrace, B.C. However, it is anticipated that the current oversupply of chips in the North is likely to continue for the foreseeable future and that reductions in chip supplies from the Kispiox AAC can be made up from other sources. Based on this assumption, there will be no direct forestry industry impacts outside the region associated with reductions in the Kispiox AAC. Therefore, direct forestry impacts for B.C. will be the same as those estimated for the Kispiox region.

(b) Fisheries. All of the management plan options, particularly C and D, are expected to better preserve fish habitat and therefore, fish stocks spawning in the Kispiox TSA. This could result in direct employment and income gains outside the Upper Skeena region in commercial harvesting and processing, or due to recreational angling which is dependent upon these stocks. Estimates of the impacts on stocks and commercial and recreational fisheries are unavailable, but impacts are expected to be relatively minor.

(c) Tourism. The Northwest region accounts for about 50% of total non-resident traffic to B.C. and about 18% of the province's visitor parties from overseas.[13] It is possible that tourists from outside B.C. would alter travel plans and related expenditures in the rest of the province as a result of management plan changes which better preserved wilderness and recreation tourism opportunities in the Upper Skeena region. Estimates of the magnitude of such impacts are unavailable at this time, but are expected to be minor. Therefore, the direct impact on the tourism sector provincially is assumed to be the same as that estimated for the Kispiox region.

Indirect Impacts

Indirect impacts on the provincial economy will result from direct effects at the regional and provincial level. For purposes of estimating these impacts, multipliers developed from Provincial Input-Output Model runs are available. Based on these runs, an employment multiplier of 2.0 is used to estimate the province-wide impacts of the various management plan options for the Kispiox TSA. Net indirect income impacts are estimated by applying this multiplier to the estimates of net direct employment (i.e., forestry losses less tourism gains) in the Kispiox presented in Tables 4, 5, and 6 and by means of an average wage of $30,385.[14] These indirect impacts at the provincial level are summarized in Table 14.

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[13] "Visitor '89", Ministry of Development, Trade and Tourism.

[14] Based on C. Davis' estimates for the northern region inflated to 1991 dollars.

TABLE 14
Potential Indirect Income and Employment Impacts in B.C.
of the Five Options Relative to the Base Case

	Options A & B	Option C	Consensus Option	Option D
Assuming Falldown to LRSY after 100 years				
Employment Losses (PYs)	73	133	160	158
Income Losses ($ million)	2.2	4.0	4.9	4.8
Assuming Falldown to LRSY after 150 Years				
Employment Losses (PYs)	125	179	189	196
Income Losses ($ million)	3.8	5.4	5.7	6.0

Direct and Indirect Impacts

The estimated direct and indirect employment and income impacts on the provincial economy of the various management plan options for the Kispiox TSA are summarized in Tables 15 and 16 below. These estimates should be regarded as potential impacts which could differ considerably in the short term depending on how AAC changes are implemented. They include estimates of possible offsetting gains in tourism-related employment.

TABLE 15
Summary of Total Potential Income and Employment Impacts on B.C.
Relative to the Base Case
Assuming Falldown to LRSY after 100 years

	Options A and B	Option C	Consensus Option	Option D
Annual Allowable Cut (m^3)	937,000	777,000	725,000	653,000
Potential Direct Job Losses (person-years)	73	133	160	158
Potential Indirect Job Losses (person-years)	73	133	160	158
Total Potential Job Losses (person-years)	146	266	320	316
Total Potential Reduction in Employment Income ($ million)	5.6	10.4	12.5	12.8

TABLE 16
Summary of Total Potential Income and Employment Impacts on B.C.
Relative to the Base Case
Assuming Falldown to LRSY after 150 years

	Options A and B	Option C	Consensus Option	Option D
Annual Allowable Cut (m^3)	833,000	686,000	675,000	581,000
Potential Direct Job Losses (person-years)	125	179	189	196
Potential Indirect Job Losses (person-years)	125	179	189	196
Total Potential Job Losses (person-years)	250	358	378	392
Potential Reduction in Employment Income ($ million)	9.6	13.9	14.7	15.8

5.2.2 Provincial Environmental Values

The most important environmental resources in the Kispiox area which are of provincial significance are the angling, rafting and grizzly bear viewing opportunities, on the Babine River. The Babine, because of its pristine nature and reputation as a steelhead sport fishery, has been designated a Class I angling site, of which there are only 4 or 5 in the province. The Kispiox River has a Class II designation (of which there are about 30 in province) and is also a well known angling destination within B.C. The Ministry of Environment, Lands and Parks has also recently announced that it is assessing the establishment of a park representative of the Hazelton Mountains landscape which could be located within the Kispiox or adjacent area.

The impacts of the various management options on fish and grizzly bear habitat throughout the Kispiox have been documented in Section 5.1.2. Throughout the area, reductions in fish and grizzly habitat and populations in Options C, Consensus and D would be about half those in the Base Case and Options A and B. However, differences among the options may not be as pronounced in terms of specific impacts on the Babine. All of the management plans, to varying degrees, exclude the river corridor from the operable area and prescribe harvesting practices to protect fish and wildlife values of the corridor.

Option D and possibly Option C and Consensus (with proper management) are the only options that would set aside sufficient land base for the development of a new Provincial park in the Kispiox. However, as noted in Section 5.1.2, the establishment

of a park will be determined largely independently of MOF's planning processes. Therefore, none of the options necessarily preclude the establishment of a park.

5.2.3 Provincial Government Finances

Changes in forestry management plans will directly affect provincial government revenues as a result of impacts on resource use and resource-related tax revenues. The principal resource-related impact would be on the forestry sector, since tourism impacts (e.g., user and license fees) are likely to be relatively minor and, under current policy, there would be no mining impacts (e.g., on royalties). Provincial revenues could also be affected by the personal income and sales tax impacts of the options. However, as noted in the guidelines, these impacts are more difficult to estimate, particularly over the medium to long term.

Provincial expenditures can be affected by changes in management plans because of direct resource-related obligations (e.g., management and administration) or because of general economic and demographic effects (e.g., changes in population-related service expenditures).

The impact of changes in the Kispiox management plan on provincial government net revenues is estimated here by changes in stumpage, logging tax and corporate income tax revenues less management and administration expenditures attributable to each option.

For purposes of this analysis stumpage revenues are estimated using the target stumpage rate for the Interior instead of an indicated rate for the Kispiox TSA. This assumes that the base rate for the Interior would not be affected by the inclusion or exclusion of the incremental TSA volumes and thus the impact on total provincial forestry revenues can be calculated by multiplying the base rate times the reduction in harvests under each option. MOF estimates of the target rate for the Interior averaged $7.70/m^3$ over 1989-1991 period.[15]

Logging and corporate income tax revenue impacts are calculated on the basis of MOF estimates of $.26/m^3$ and $1.07/m^3$, respectively. These estimates are average

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[15] By using the base rate the analysis captures the impact on provincial revenues. This need not equal the stumpage generated in the TSA. For example, the indicated stumpage rate for the TSA may be lower than the base rate, suggesting a lower revenue impact in the options. However, excluding that volume of timber from the provincial harvest would tend to increase the indicated rates elsewhere in the interior, leaving the net effect on provincial revenues determined by the base rate. It is assumed here that bid prices for SBFEP timber are similar to the target rate.

rates calculated as province-wide revenues from these taxes divided by total harvest volumes over the 1986-90 period.[16] These rates may not apply to incremental management plan changes in the Kispiox.

Provincial forestry expenditures are defined as marginal MOF timber sale, silviculture and road building/maintenance costs for each option. Province-wide, these costs are estimated by MOF at $1.87/m^3$.[17] The estimated impact of the various management options on Provincial net revenues is presented in Table 17.

TABLE 17
Impact of Options on Provincial Government Finances
($ thousands/year)

	Options A and B	Option C	Consensus Option	Option D
100 Year Falldown				
Reduced Total Gov't Revenue				
Stumpage[a]	1,256	2,486	2,888	3,439
CIT & Logging Tax[b]	217	429	499	594
Reduced Gov't Costs[c]	305	604	701	835
Reduced Net Revenues	1,168	2,311	2,686	3,198
150 Year Falldown				
Reduced Total Gov't Revenues				
Stumpage	2,057	3,185	3,273	3,998
CIT & Logging Tax	355	550	565	691
Reduced Gov't Costs	500	774	795	971
Reduced Net Revenues	1,912	2,961	3,043	3,718

(a) Based on Interior base rate of $7.70/m^3$.
(b) Based on B.C. average corporate income tax and logging tax paid per m^3 of $1.06/m^3$ and $.26/m^3$, respectively.
(c) Based on estimated marginal MOF costs for B.C. of $1.87/m^3$.

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16 *Economic Impacts of Timber Harvesting in B.C.*, MOF, Dec. 1991.

17 Based on 1990/91 MOF data for B.C., weighted to reflect the relative importance of licensee and SBFEP volumes in the Kispiox. It is assumed that administrative overheads and forest protection costs do not vary with changes in management plans. Costs also exclude basic silviculture for major licensed areas, since these costs are now the responsibility of license holders. Cost estimates specific to the Kispiox TSA may vary from those used here.

5.2.4 Economic Efficiency of Resource Use

The purpose of this account is to estimate how changes in management plans for the Kispiox TSA affect quantifiable net benefits from forestry and other resources in the region. For commercial resources, like wood products, this means estimating the impacts of each plan on market values for affected resources less all private and public costs incurred to produce them. For non-commercial resources, this entails estimating the amount that users benefit from these resources. This is typically measured by the maximum amount that users would be willing to pay for them based on survey or travel cost studies. The overall change in economic efficiency of resource use or net resource values is summarized as the net present value of annual impacts associated with each management plan.

Of commercial resources, the major impact would be on the forestry resource, since the impacts on other commercial resources would be relatively small. For non-commercial resources, the most important impacts would be on recreation and wilderness activities, as well as subsistence food uses.

Commercial Timber Values

A proxy for the net return per m^3 to the forestry resource in the Kispiox TSA is the weighted average of the indicated stumpage rate for major licensee volumes and bonus bids on SBFEP volumes less marginal MOF costs. The indicated rate for each area is the base rate for the Interior plus or minus the difference between area and average Interior estimated value indexes (net private return), all on a per m^3 basis. Marginal MOF costs were estimated in Section 5.2.3 above.

The use of indicated stumpage rates to estimate net resource value has a number of problems. For example, indicated rates do not directly take into account changes in operating and development (road-building) costs resulting from management plan changes. Nor do they take into account possible increases in bid prices for SBFEP timber volumes in the Kispiox or in adjacent TSAs, resulting from more intense competition for wood supplies. However, given the data requirements associated with more direct measurement approaches, indicated rates are considered at this time to be the best means available of estimating net resource values.

The weighted (by volume) average billed rates (including indicated stumpage and bonus bid revenues) for all stumpage-bearing timber in the TSA for the 1990-1991 period is \$5.71/m^3. Marginal MOF costs are estimated at \$1.87/m^3. The overall reduction in net forestry value in any given year is estimated as the loss in harvest

volumes for that year times the billed rate less marginal costs, or $3.84/m³. The total reduction in net value is then calculated as the present value of a 50-year stream of annual losses, discounted at 8%.[18] The estimated annual and net present value of losses in net forestry values are shown in Table 18.

Recreational and Wilderness Values

Most of the management options being considered would better protect or enhance the value of non-commercial recreation, wilderness and subsistence food resources in the Kispiox relative to the Base Case, thus offsetting, to some extent, losses in the forestry sector. Estimates of the impact of the various management plan options on these values are based on estimated impacts on user-days in recreational and wilderness activities by B.C. residents[19] and estimates of the value of these user-days derived from studies on similar activities. Data on subsistence activities and harvests in the Kispiox TSA by Native people are not available.

As stated in Section 3.1.2, the Kispiox TSA supported 28,500 angling days, of which about 82%, or 23,000 were by non-guided B.C. residents. Ministry of Environment estimates indicate that the area also supported an estimated 31,000 days of hunting and 86,000 days of non-hunting wildlife related activities by non-guided B.C. residents.[20] The total economic value of these activities, based on willingness-to-pay estimates by the Ministry of Environment (adjusted for inflation), is about $3.4 million annually.[21]

As in Section 5.1.1, it is assumed that the Base Case, and Options A and B would maintain the total value (i.e., user-days times value per user-day) of angling and other wilderness activities at current levels. Options C and Consensus would permit some growth in use and the value of use over time to a maximum annual level about 60% above current activity, to about $5.4 million per year. Option D would permit

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18 An 8% discount rate is consistent with rates used in traditional benefit-cost analysis. Values discounted at 8% are negligible after 50 years.

19 It is assumed here that non-guided recreation and wilderness uses by B.C. residents represent the non-commercial aspect of these activities.

20 See R. Reid, et al. for the Wildlife Branch, B.C. Ministry of Environment, 1983-1986. Reid's estimates are for the Skeena Region. It is assumed that 20% of this use is in the Kispiox.

21 R. Reid, op. cit. Values updated to $1991 by means of Statistics Canada's Consumer Price Index are $32 day for angling, $35 day for hunting and $18 day for non-hunting activities.

growth to a level between 2 and 3 times current activity, to about $8.6 million per year.

For purposes of estimating the present value of these impacts over time, it is assumed that the total value of recreational and wilderness activities in the Kispiox will grow at a constant rate until the "maximum" is reached in 50 years. For Options C and Consensus, this means an annual growth rate in non-commercial wilderness values of about 1% per year, and for Option D, a growth rate of 2%. A discount rate of 8% is used, as for forestry values.

The impact of the management options on overall net resource values is summarized in Table 18. Note that these estimates exclude impacts on Native subsistence values. Also, wilderness values are presented only in terms of net present value since they are based on a growth rate assumption and therefore are not directly comparable to forestry values on a constant annual basis.

TABLE 18
Impact of Options on Economic Efficiency of Resource Use

	Options A&B	Option C	Consensus Option	Option D
100 Year Falldown				
Forestry Values				
Annual Losses[a]	627	1,240	1,441	1,716
NPV of Losses @ 8%	7,668	15,176	17,630	20,996
Other Resource Values				
Annual Gains	(N/A)			
Annual NPV of Gains[b] @ 8%	-	5,597	5,599	12,584
Net Resource Values				
Annual Losses	627	(N/A)	(N/A)	(N/A)
NPV of Losses @ 8%	7,668	9,579	12,033	8,412
150 Year Falldown				
Forestry Values				
Annual Losses	1,027	1,589	1,633	1,995
NPV of Losses @ 8%	12,562	19,444	19,980	24,409
Other Resource Values				
Annual Gains	(N/A)			
NPV of Gains @ 8%	-	5,597	5,597	12,584
Net Resource Values				
Annual Losses	1,027	(N/A)	(N/A)	(N/A)
NPV of Losses @ 8%	12,562	13,847	14,383	11,825

(a) Indicated stumpage and bonus bid losses less incremental MOF costs.
(b) Assumes growth rates in total willingness-to-pay of B.C. residents for recreation and wilderness uses of zero for A and B, 1% annually for C and Consensus and 2% annually for Option D.

5.3 Summary of Results

Tables 19 and 20 provide summaries of the regional and provincial evaluation accounts, respectively, for the two illustrative implementation scenarios under each of the five options. Indicators are quantitative or qualitative, depending on the nature of the account and the availability of data. Quantitative impact indicators are presented on an annual basis for all accounts except the efficiency account which uses net present value. Impacts are all measured relative to the Base Case which will itself change due to a number of factors discussed in Section 3.0.

Regional Accounts

Table 19 shows that the AAC reductions chosen to illustrate Options A and B would result in the lowest potential employment and income losses and the lowest risk of local government revenue losses of all the management options. This is despite the assumption that these options would not permit any long term growth in tourism in the area. A and B would also be the least disruptive in terms of community and social impacts (with the exception of social integration) since these are strongly correlated with job impacts. Options A and B would have the most negative impact of all the options on local wilderness/recreation values and Native subsistence uses.

Option D AAC scenarios would potentially result in the highest job/income losses and community impacts of all the options. This is because the estimated economic gains generated by enhanced recreation and wilderness values (i.e., assumed growth rate of 2% annually) are more than offset by economic losses associated with reduced activity in the forestry sector. Option D would best protect local environmental values and Native subsistence uses.

The impacts of AAC scenarios which illustrate Option C and Consensus, would fall between Options A B and D in terms of impacts on the regional economy, local communities (Native and non-Native) and environmental values. However, these scenarios best promote community integration since they represent an attempt to balance community environmental and economic goals.

Provincial Accounts

As shown in Table 20, the AAC reductions used to illustrate Options A and B would result in the lowest employment, income and revenue losses; and lower economic efficiency losses of most options at a provincial level. However, Options A and B would be least protective of provincially significant environmental and recreational values, in particular angling and grizzly bear viewing on the Babine River, and wilderness/scenery values in the Seven Sisters and Swan Lake areas.

The AAC scenarios under Option D would generally have the highest impacts of all the options in terms of economic indicators and would be most protective of provincially significant environmental and recreational values. It is interesting to note that Option D results in lower efficiency losses than Options A and B in the 150 year falldown scenario. This is because the present value of growing recreation and wilderness values in Option D more than offset reductions in net timber values. This result is very sensitive to the assumed difference between options in growth

rates for recreation/wilderness values. For example, this result would be reversed if the assumed growth rate differential between Options D and A/B is 1% rather than 2%.[22] Note that growth in recreation/wilderness-related jobs and income in Option D is not sufficient to offset potential losses in timber-related employment. This is because the estimated value of non-commercial uses in the TSA are significant, but the employment associated with non-commercial uses is minor in relation to forest sector employment.

AAC scenarios under Options C and Consensus fall between A/B and D in terms of provincial revenue losses and impacts on provincially provincial environmental resources. However, Options C and Consensus result in the highest net resource losses because the assumed growth of 1% in recreation/wilderness values is more than offset by reductions in timber values. This suggests that the consensus option is the least economically efficient of all the options.

There are several important caveats to the above results. Economic losses and community impacts could be lower than estimated here if Base Case employment were to decline due to factors unrelated to changes in the management plan. For example, this might occur with rationalization of processing capacity, leaving more timber for surviving mills, or technological change in harvesting or processes. Harvest and employment levels in the Kispiox are currently below levels assumed in the Base Case due to market conditions. Also, AAC reductions could be phased in to mitigate impacts or allow for a period of adjustment by individual workers and the community.

Another important qualification is that all of the management options considered can be sustained for longer periods of time than the Base Case. Thus, while reduced AAC's in these options mean lower economic activity, they can be sustained for longer periods of time than the Base Case. Another way of stating this is that if the Base Case were subject to the same sustainability criteria as the management options (i.e., 100-150 years), it too would entail AAC reductions and associated economic losses.

Finally, the above results may not adequately reflect the economic implications of environmental impacts, due to lack of information and rather arbitrary assumptions

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[22] Discount rate assumptions also affect the results of the economic efficiency account. Sensitivity analyses at 6% and 10% showed that a lower discount rate favoured Option D since wilderness values growing over time are not discounted as heavily. A higher discount rate resulted in Options A/B showing lower net resource losses than Option D.

about the linkages between impacts and economic value. For example, the value of impacts on Native uses and on habitat of commercially caught salmon are not estimated. The effect of varying assumptions regarding growth rate differentials between options in recreation/wilderness values is noted above.

TABLE 19
REGIONAL ACCOUNTS
Evaluation Summary[a]

ACCOUNT	OPTIONS			
	A & B	C	Consensus	D
Regional Economic Development[b]				
Employment Losses (PYs/yr)	100-173	184-249	223-263	223-276
Income Losses ($ million/yr)	4.3-7.3	8.0-10.6	9.5-11.3	10.0-12.5
Environmental Values				
Recreation & Wilderness Activity (annual growth rate in value[c])	-	1%	1%	2%
Community Characteristics/ Quality of Life				
Population (Impact Rating)	Lowest	Moderate to High	Highest	Highest
Social Services (Impact Rating)	Lowest	Moderate to High	Highest	Highest
Social Integration (Impact Rating)	Moderate	Lowest	Lowest	Highest
Local Government Revenues (Risk of Mill Closure)	Lowest	Moderate	Moderate	Highest
Specific Native Community Concerns				
Native Subsistence Use (Harvest Level)	Decrease	Slight Decrease	Slight Decrease	Same as Now

(a) Range represents range of annual impacts associated with the two AAC scenarios under each option (i.e., falldown to LRSY after 100 and 150 years).
(b) Includes direct and indirect impacts associated with changes in timber harvesting/processing and tourism activity.
(c) Total willingness-to-pay value of wilderness and recreational activities.

TABLE 20
PROVINCIAL ACCOUNTS
Evaluation Summary[a]

ACCOUNT	OPTIONS			
	A & B	C	Consensus	D
Provincial Economic Development[b]				
Employment Losses (PYs/yr)	146-250	266-358	320-378	316-392
Income Losses ($ million/yr)	5.6-9.6	10.4-13.9	12.5-14.7	12.8-15.8
Environmental Values				
Provincially Significant Environmental Values (Impact Rating)[c]	Highest	Lower	Lowest	Lowest
Provincial Government Finances				
Net Revenue Losses ($ millions/yr)[d]	1.2-1.9	2.3-3.0	2.7-3.0	3.2-3.7
Economic Efficiency of Resource Use				
Net Resource Value Losses[e] ($million NPV)	7.7-12.6	9.6-13.8	12.0-14.4	8.4-11.8

(a) Range represents range of impacts associated with the two AAC scenarios under each option (i.e., falldown to LRSY after 100 and 150 years).
(b) Includes direct and indirect impacts associated with changes in timber harvesting/processing and tourism activity. Includes regional impacts.
(c) Refers primarily to angling and grizzly bear viewing on the Babine River and wilderness/scenery values in the Seven Sisters/Swan Lake area.
(d) Estimated base stumpage plus corporate income and logging tax losses less incremental MOF costs. Excludes impacts on tourism and recreation and related taxes and fees.
(e) Estimated as indicated stumpage plus bonus bids less incremental MOF costs less "willingness-to-pay" value of recreation and wilderness gains. Estimates here are based on a discount rate of 8% and annual growth rates in recreational/wilderness values of zero for A and B, 1% for C and Consensus and 2% for Option D.

Recommendations for Mitigation of Social Impacts

As noted elsewhere, the most effective means of mitigating the social impacts of the proposed forest land management options would be to phase in the AAC reductions over time to allow residents sufficient time to adjust to a changing local economy. The value of a phased approach for residents of the area cannot be underestimated. It would greatly minimize social disruption and permit time for the economic and educational planning that would be required for the region to successfully adapt to new forest management practices.

Well before implementation of any of the options under consideration, pro-active planning must be initiated for employment retraining programs. Retraining programs are generally identified as necessary by external government agencies after a major shutdown or major economic upheaval; however, the development of appropriate programs is a challenging task. There would be three important considerations in developing retraining programs in the study area. The first would be that the community itself, as opposed to outside agencies, define the contents and delivery of such programs. The second would be to set up mechanisms that would provide long term financial and other support for implementation. The third factor would be to determine the ability and willingness of local residents to retrain; a survey or interview program would be required to identify the most appropriate approach to retraining.

Planning for social services must also occur before implementation. Income support and Community Mental Health services in the area are currently operating at capacity; the offices have limited ability to take on more clients at current levels of staff and resources. Large scale or sudden employment reductions would clearly necessitate a significant increase in the level of service. If these services were not in place prior to implementation, the social adjustment of residents to changing economic circumstances would be far more difficult, lengthy, and ultimately, more costly.